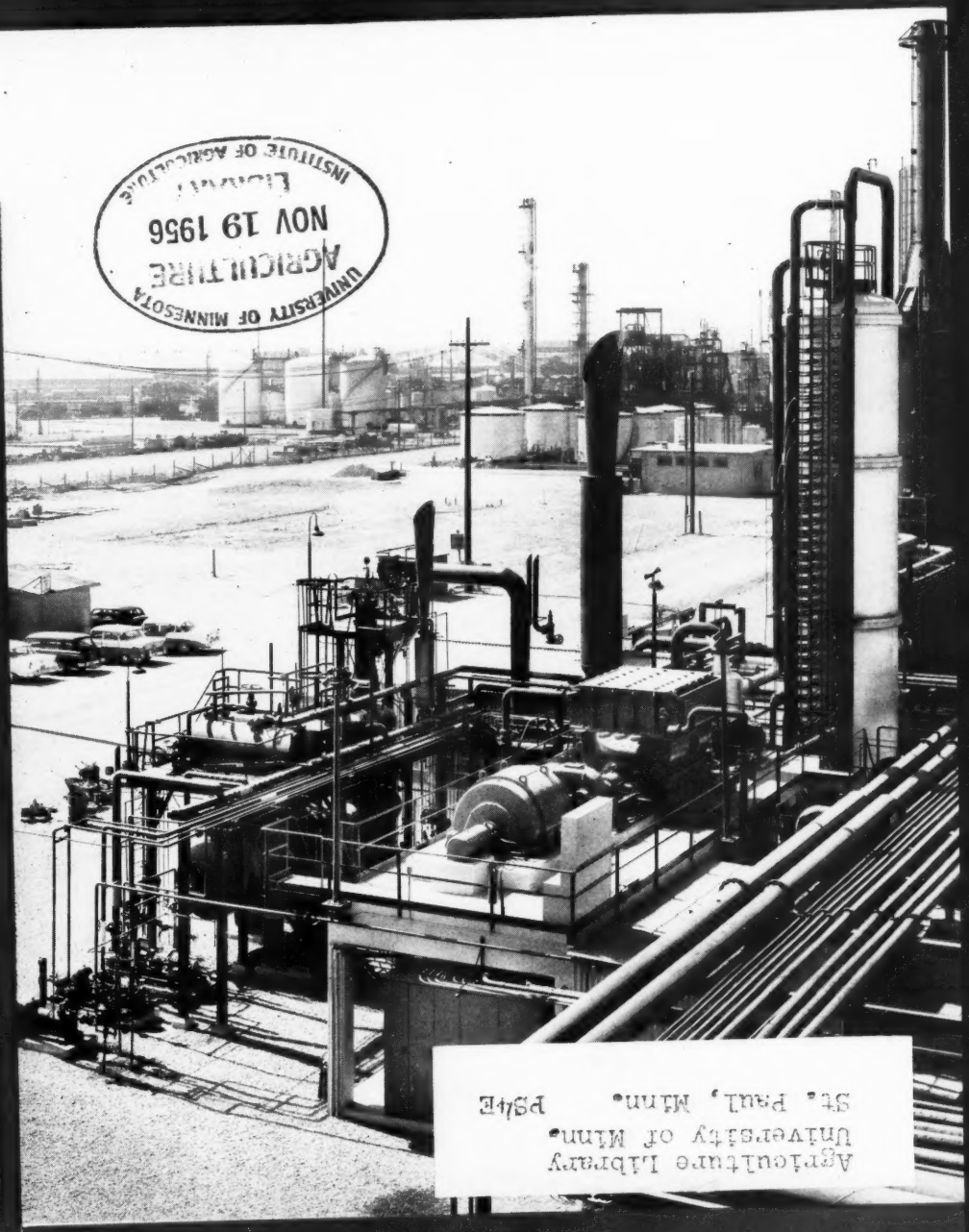
Farm Chemicals



ioneer Journal
f the Industry

elopments in
est Control . 42

eral Legislation
fecting Ind. . 45

Spray Fert.
peration . . . 48

Agri. Chem.
ssn. Meeting . 50

ride
valuation . . . 54

UNIVERSITY OF MINNESOTA
AGRICULTURE
NOV 19 1956
INSTITUTE OF AGRICULTURE
LIBRARY

Agriculture Library
University of Minn.
St. Paul, Minn. PS4E

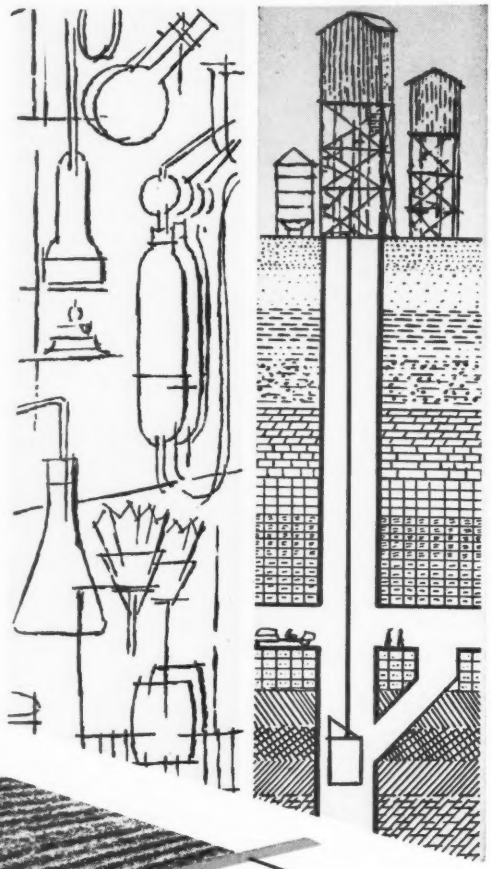
Vol. 119 No. 11 NOVEMBER 1956 50 Cents

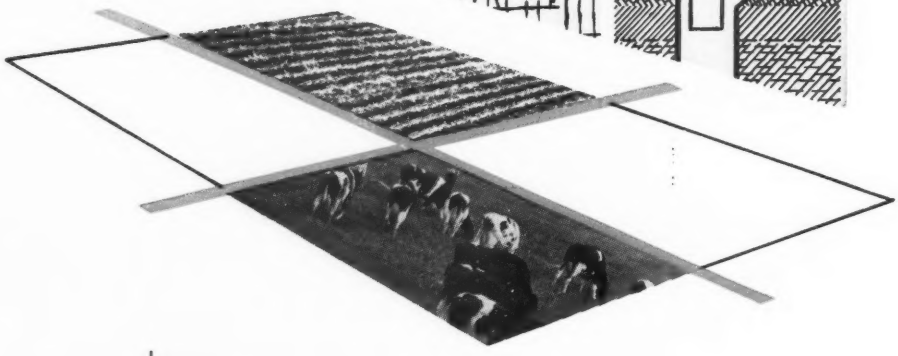
LOOK TO NATIONAL POTASH FOR QUALITY AND SERVICE

Backed by the skills and experience of its parent companies – Pittsburgh Consolidation Coal Company and Freeport Sulphur Company – NATIONAL POTASH offers important advantages as a dependable source of quality potash.

NATIONAL'S mining operations and refining processes will include the very latest industry techniques, and its storage and shipping facilities have been planned to meet efficiently the demand of the peak fertilizer season.

In addition, NATIONAL POTASH provides a free, comprehensive Technical Service to help manufacturers with granulation, formulation and other production problems. Write for complete information.





NATIONAL POTASH COMPANY

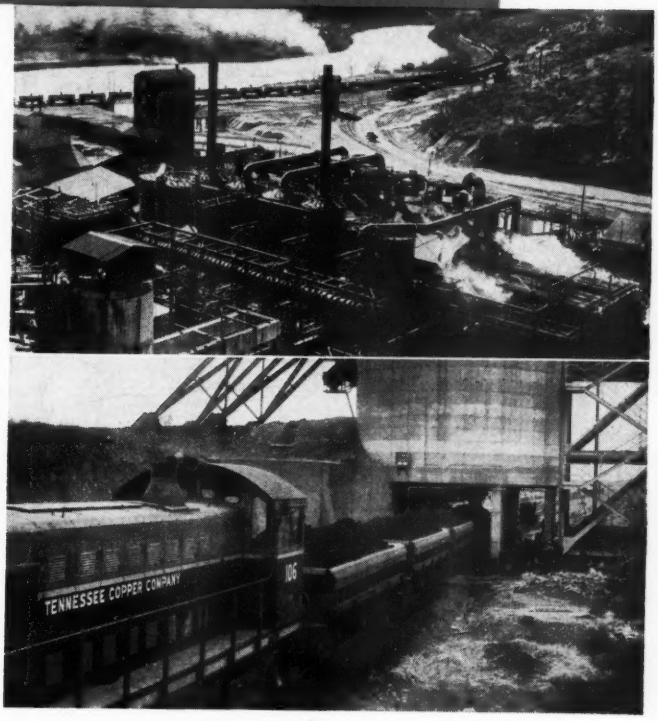
205 EAST 42nd ST. • NEW YORK 17, N.Y.

TENNESSEE CORPORATION

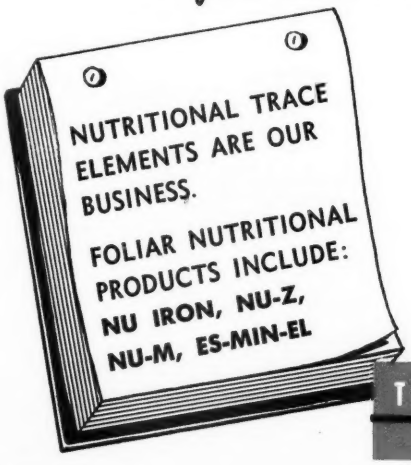
TENNESSEE CORPORATION
PRIMARY PRODUCERS OF FERTILIZER CHEMICALS

Including:

- MANGANESE SULFATE
- MANGANOUS OXIDE
- COPPER SULFATE
- ZINC SULFATE
- IRON SULFATE
- MINERAL MIXTURES



Over 30 years experience in nutritional trace-element manufacture, research and application to mixed fertilizers



YOU are assured a *consistent* basic source of quality materials.

YOU cut costs with combined carloads from one *basic* source.

YOU can save money, time, plant space and effort through the use of our custom formula mineral mixture service.

WE back up our products with service, research and technical assistance.

For further information please make requests on your company's letterhead.

TENNESSEE CORPORATION

617-29 Grant Building, Atlanta, Georgia

Farm Chemicals

NOVEMBER, 1956
No. 11
Vol. 119

Pioneer Journal of Farm Chemicals Industry, Est. 1894

INDUSTRY NEWS

Business & Management . . . 4
Associations & Meetings . . . 24
People . . . 19
Government . . . 26
Calendar . . . 25

FEATURES

Recent Developments in Pest Control . . . 42
Dr. Philip J. Spear
Pending Federal Legislation Affecting the Industry . . . 45
John Harms
Association of American Fertilizer Control Officials Meets 47
Giant Calspray Plant Food Operation . . . 48
Canadian Agricultural Chemicals Assn. Meets . . . 50
National Fertilizer Solutions Association Meeting . . . 53
Crop Protection With Pesticides Evaluated . . . 54
Hubert Martin
Chilean Nitrate Producers Get $28 Million Loan . . . 68

DEPARTMENTS

Viewing Washington
On Agriculture . . . 29
On Business . . . 30
Reader Service . . . 37
Equipment & Supplies . . . 58
Suppliers' Briefs . . . 59
Pest Reports . . . 61
Chemicals . . . 63
Markets . . . 64
Patent Reviews . . . 66
Dr. Melvin Nord
Statistics . . . 67
Buyers' Guide . . . 71

STAFF

Publisher . . . SAM LEWIS VEITCH
Editor . . . W. P. SCHLICHT
Editorial Assistant . . . PHYLLIS GERHART
Wash. Bureau Chief . . . JOHN HARMS
Business Manager . . . A. A. WARE
Advertising Manager . . . WARD CRANE

ADVERTISING REPRESENTATIVES

Chicago 1. Al Zilenziger, 333 N. Michigan Avenue . . . STate 2-7128
Los Angeles 36. Hughlett Hollyday, Jr., 5478 Wilshire Blvd. . . . WEbster 8-1201
New York. Rod Zilenziger, 415 Lexington Ave. . . . MUrray Hill 7-1488
San Francisco 4. William Blair Smith, Russ Building . . . Exbrook 2-3723

BPA
Member
Business Publications Audit

A magazine national in scope and circulation and devoted to manufacturers, mixers and formulators of plant foods and pesticides. It has a free controlled circulation within specified segments of the industry.

Subscription rates to all others are: U.S., its possessions, Canada, Cuba and Panama—$6.00; Mexico and foreign: $7.50. Single Copy—$.50. Back Numbers $1.00.

Published monthly by Ware Bros. Company, 317 N. Broad St., Philadelphia 7, Pa.
Telephone MArket 7-3405
Acceptance under Section 34.64 P. L. & R., authorized

In this issue . . .

Starting on page 42 is a penetrating article on the Pest Control field, covering the various areas of importance to members of the industry. Written by an authority on the subject it will be worthwhile reading.

John Harms, FARM CHEMICALS' Washington Reporter, presents the latest information on what to look for in legislation when congress convenes this coming January. Story on page 45.

Full coverage is given to the tenth annual meeting of the Association of American Fertilizer Control Officials. Various papers presented and the discussion regarding the possibilities of changing to an elemental basis for P and K analysis is also given on page 47.

The proceedings of the fourth annual meeting of the CACA at Ontario, Canada, are presented on page 50. Various subjects of mutual interest to industry members both in the United States and Canada are covered.

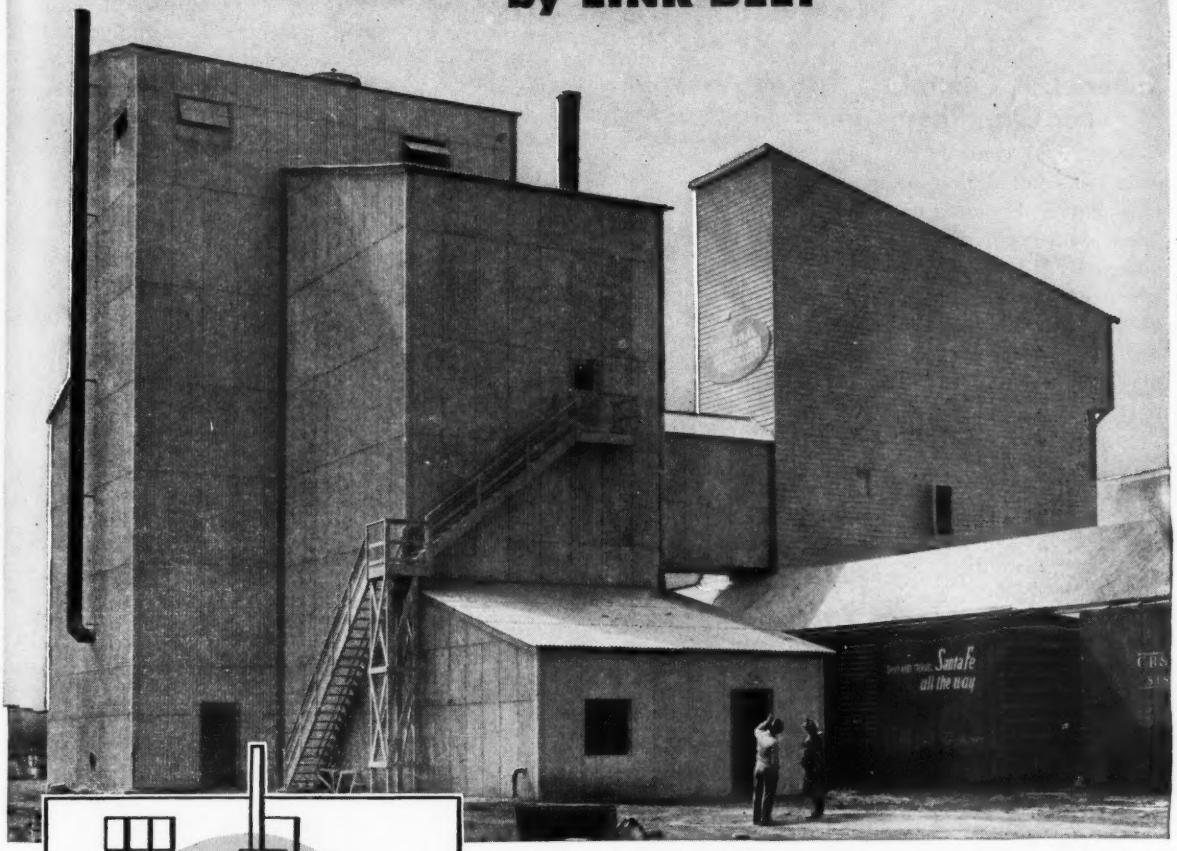
Covering the National Fertilizer Solutions Assn. meeting on page 53, are some excerpts of interesting papers presented. Information of marketing and merchandising of fertilizers is presented by industry authorities.

On page 54, we offer an article which we believe will clarify some of the questions many people have in regards to the way pesticides work and in what direction we are going at the research level.

Cover story

In the production of complex fertilizers, nitric acid is required in large quantities. The cover photo illustrates the Standard Oil Company of California's operation in supplying this important ingredient to Calif. Spray-Chemicals fertilizer plant located at Richmond, Calif.

3rd GRANULAR FERTILIZER PLANT
furnished for Federal Chemical by LINK-BELT



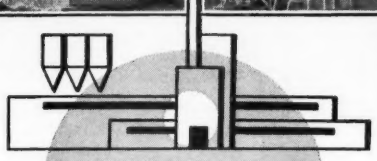
40 TONS OF MIXED FERTILIZER are produced hourly at Federal's new Danville (Ill.) plant. Process utilizes anhydrous ammonia and ammonium nitrate solutions.

Supplies handling and processing equipment to put TVA continuous ammoniator system "on stream"

PROVED in two previous Federal Chemical Company plants, Link-Belt equipment was chosen for a third installation. And this same top performance and efficiency was achieved to produce top-grade fertilizer at low cost.

Link-Belt will work with your own constructors to design and equip a new plant—or modernize your present system. Or we can handle complete erection under a single *"turn-key"* contract.

Link-Belt offers a complete line of handling and processing equipment plus broad experience in the production of every type of fertilizer. Whether you produce dry-mix, superphosphate, ammonium phosphate, ammonium nitrate, ammonium sulphate, urea or granular — call your nearest Link-Belt office. Or write for Book 2459.



LINK-BELT "turn-key" SERVICE unlocks new efficiencies in fertilizer production

Under this inclusive 5-point program, LINK-BELT will:

1. **PILOT THE PROCESS,** using our complete laboratory and test facilities.
2. **DESIGN THE SYSTEM** as an efficient, integrated operation conforming to your exact needs.
3. **FABRICATE THE EQUIPMENT.** Link-Belt makes a complete line—will also supply special requirements.
4. **ERECT THE PLANT,** providing crews and supervisory service.
5. **START THE OPERATION,** with field engineers ready to make final adjustments.

LINK-BELT

PLANTS AND EQUIPMENT FOR THE FERTILIZER INDUSTRY

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,229

Business & Management

. . . News of the Industry

Stiffer FDA Controls For Org. Phosphates

More rigid controls are being placed on combinations of organic phosphate insecticides because of "new evidence," FDA has announced. It has been found that when employed together, they are more dangerous than when used singly, Food and Drug Commissioner George P. Larrick reported.

Some scientists thought that one organic phosphate might increase the toxicity of another when used in combination, and Larrick said that experiments bore out the theory.

As an example, it was pointed out that while it takes 50 ppm of EPN to produce a poisonous effect and 250 ppm of malathion, tests on dogs indicated that when used in combination, only 20 ppm EPN and 100 ppm malathion produced the same results.

"The FDA has been careful in establishing tolerances," said Larrick. "There is no indication that the tolerances now in effect for any of the organic phosphates constitute any hazard to the public health. But to be sure that we continue to safeguard the consumer adequately, we are going to require more evidence of safety in dealing with this type of compound in the future."

In the future, FDA said that manufacturers must provide experimental evidence which shows that toxicity of a given compound when fed to test animals with each of the other organic phosphates is within safe limits. The agency added that if additional evidence shows organic phosphates can be used in combination without hazard, the requirement will be relaxed.

Tests also may be conducted to determine whether mixtures of other insecticides also increase toxicity.

N Div. Increases Outdoor Ads

Major increase in outdoor posting is scheduled this fall for Nitrogen Div., Allied Chem. & Dye Corp.'s Arcadian 12-12-12 and Uran. The program, via Albert Sidney Noble Adv. Agency, will cover selected agricultural regions in twelve states, reports Outdoor Advertising, Inc.

Agriform Sells Assets To Four New Firms

An agreement has been announced by Agriform Co. president John C. Anderson for the sale of all physical assets of Agriform, which will be liquidated and succeeded by four new, separate independent corporations. Each of the new firms will purchase part of the total assets and continue the business.

The corporations are Agriform Co. of Imperial Valley, Inc., W. H. Remsen, president; Agriform Co. of Kern Co., Inc., F. E. Wingate, pres.; Agriform Co. of Corcoran, Inc., Donald Hixon, pres.; and Agriform Co. of No. Calif., Inc., D. W. Galbraith, pres.

Dow Sales Up, Earnings Decrease

Dow Chemical Co. has reported net sales of $150,784,025 for the first quarter of its fiscal year ended Aug. 31. This compares with $128,166,671 recorded in the same months of 1955.

First quarter earnings after taxes were $11,275,315 as compared with $11,723,647 in the 1955 period.

Incorporations

Delta Ammonia Co., Clarksdale, Miss., has been granted a charter of incorporation, with capital stock listed as $15,000.

DeSoto Chemical & Supply Co., Hernando, Miss., has been granted a charter to deal in fertilizers, petroleum products and machinery. Capital stock is listed as $100,000.

Jacobus Invests In Gibson Fert. Co.

Robert Jacobus has purchased the partnership previously held by Henry Sloan in Gibson Fertilizer Co., Princeton, Ind. Other member of the firm is Luther Lintz.

IN GRAPES, POTASH-ENRICHED FERTILIZERS MAKE THE DIFFERENCE

with sufficient potash

without sufficient potash

Grapes or green beans—in anything that grows—good rich soil makes the difference between good crops and bad. Balanced fertilizers are needed to insure healthy bumper crops. And it's the potash in these balanced fertilizers that builds resistance to plant diseases and improves quality and yield.

USP's high-grade muriate of potash has the highest K_2O content and is free-flowing and non-caking—important advantages in the manufacture of these modern fertilizers which help American farmers to better crops and better incomes.

UNITED STATES POTASH COMPANY

DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION

30 Rockefeller Plaza, New York 20, N. Y.

Southern Sales Office
Rhodes-Haverty Building, Atlanta, Georgia

SUNSHINE STATE POTASH — A PRODUCT OF NEW MEXICO U.S.A. — REG. U. S. PAT. OFF.

HIGRADE MURIATE OF POTASH 62/63% K_2O

GRANULAR MURIATE OF POTASH 60% K_2O MIN.

Diamond Alkali Adds to Deer Park Facilities

To keep pace with the steadily growing consumption of chlorine and caustic soda by Gulf Coast chemical industries as well as to meet its own increasing requirements, Diamond Alkali Co. plans a multi-million-dollar expansion program at its Deer Park Plant along the Houston Ship Channel.

Frank Chrencik, general manager of the company's Electro Chemicals Div., said the project is designed to "increase Diamond's present daily production capacity of electrolytic products at Deer Park by approximately 40 per cent, or 200 tons of chlorine, 220 tons of caustic soda and 2 million cubic feet of hydrogen."

The additional facilities are expected to be completed and put into operation during the first half of 1958.

AP&C Directors Declare Quarterly Dividends

The board of directors of American Potash & Chemical Corp. have declared quarterly cash dividends of 25 cents a share on Class A and common stocks payable Dec. 15, 1956, to stockholders of record Dec. 1, and a stock dividend of three per cent payable in common stock on Jan. 9, 1957 to Class A and common stockholders of record Dec. 1.

The quarterly dividend of $1 a share on $4 Cumulative Preferred Stock, Series A, also was declared, payable Dec. 15 to shareholders of record Dec. 1, 1956.

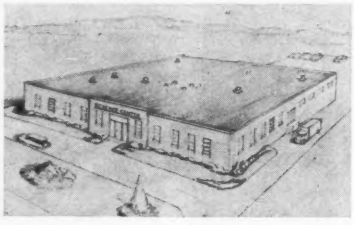
UK Sulfuric Acid Facilities Completed

New facilities to produce sulfuric acid and ammonium sulfate have been completed by the Chemical Products Dept. of the United Kingdom's South Eastern Gas Board at Phoenix Wharf.

Yearly capacity is 44,000 tons of 77 per cent sulfuric acid and 30,000 tons of ammonium sulfate.

Three Firms Locate In Science Center

Insect Control and Research, Inc., Cornell Chemical and Equipment Co., Inc., and American Bio-Chemical Laboratory, Inc. are sharing separate but adjacent



facilities in Science Center, on North Rolling Road, just west of Baltimore.

The center, of which Dr. Eugene J. Gerberg is president, houses library and reference rooms, offices, conference rooms, varied laboratory and testing areas, warehouse and service facilities. Designer is M. B. Leonard and constructor, Ira C. Rigger, Inc.

Kan. Scientists Take Soil Temperatures

Soil temperature to depths of 8 feet is being recorded by a network of soil thermometers recently installed by Kansas Agricultural Experiment Station scientists.

L. D. Bark, meteorologist, explained that one-third of plants are below the surface and exposed to soil temperature, one of the elements involved in plant production. Both the processes that supply nutrients to plants and processes that influence growth are affected by soil temperatures.

Overpopulation May Become U.S. Problem

Overcrowding and population pressure is the Orient's main problem, and not inefficient food production, Dr. Firman E. Bear reported to the Division of Fertilizer & Soil Chemistry at the American Chemical Society meeting in Atlantic City during September.

He feels that this is likely to become the problem of the U. S., too. Although he estimates that this country can probably produce enough food to feed one billion people, he adds that we should seriously think about how many people we can afford. How long can we continue with yearly addition of the equivalent of a 60,000-person city in every state without being on one another's way, Bear asks. To those who point to the new markets provided by growth of population, he warns that much of our most productive land is fast being lost to cities, plants and reservoirs.

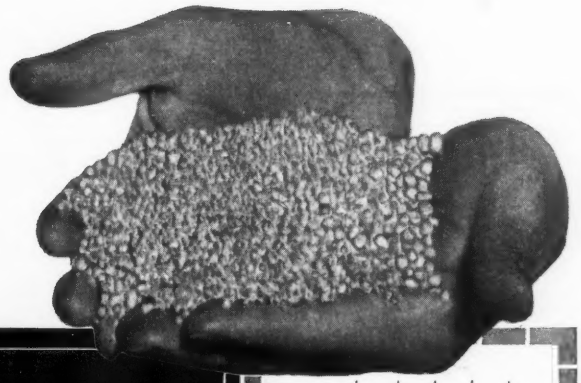
Dr. Bear, editor of *Soil Science* and retired chairman of the Soils Dept., Rutgers University, recently returned from a world-wide tour, during which he spent much time in the Far East.

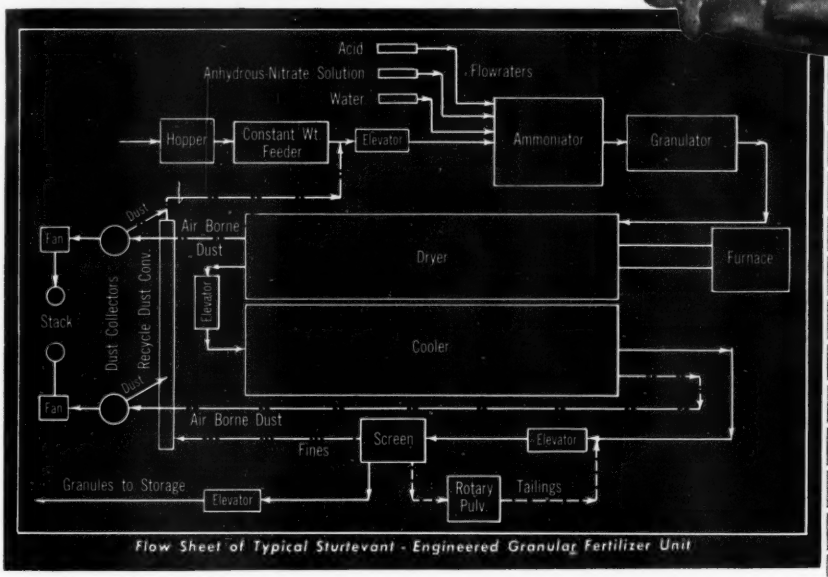
Stauffer-West End Merger Approved

Merger of West End Chemical Co. into Stauffer Chemical Co. has been approved by stockholders of both companies and was expected to become effective in October.

Of the 3,076,705 shares of Stauffer common stock outstanding, 2,737,587 shares or 89 per cent were voted in favor of the merger, and 85 per cent, or 1,709-751 shares of West End common stock outstanding, were voted for of the merger.

Granular Fertilizer Can Be in Your Future, too!





Flow Sheet of Typical Sturtevant - Engineered Granular Fertilizer Unit

LET STURTEVANT ENGINEERING AND EQUIPMENT MAKE THIS YOUR GRANULAR FERTILIZER UNIT

If you operate a mixing plant, there's a granulator in your future. The signs are unmistakable. Granular fertilizer is replacing its powdered cousin faster than modern processors can keep up with the demand.

Take the case of Canada Packers, Limited, of St. John, New Brunswick. Fourteen months after Sturtevant engineers assisted in adapting this customer's plant to a granular product, the balance of orders had shifted to 70% granular against 30% powder — *and management expects in a very short time (perhaps as you read this) that shipments will be 100% granular.*

Of course, we at Sturtevant Mill Co. are not market authorities, although we do believe this experience by Canada Packers, Limited is significant.

Our business is to assist you with the designing and engineering of the best possible granular fertilizer unit for your needs — also super phosphate units and conventional mixing units, according to your requirements.

Serving the fertilizer industry has been our business since 1873 . . . which is why you won't get rash promises or rush engineering when you come to Sturtevant. You will get a unit that will produce *what* it's supposed to *when* it's supposed to.

Why not let Sturtevant help you to spell out *your* future in granular fertilizers by writing today? Use the convenient coupon on the right.

STURTEVANT

Dry Processing Equipment

The "OPEN DOOR" to *lower* operating costs over *more* years

PULVERIZERS • CRUSHERS • MICRON-GRINDERS • GRANULATORS • SEPARATORS
SCREENS • MIXERS • FEEDERS • ELEVATORS • CONVEYORS
MECHANICAL DEN & EXCAVATORS

STURTEVANT MILL COMPANY, 140 Clayton Street, Boston 22, Mass.

Please send me your bulletin on Granulators ☐
Also bulletins on Sturtevant machines for:

☐ CRUSHING ☐ GRINDING ☐ PULVERIZING
☐ MICRON-GRINDING ☐ SEPARATING ☐ MIXING
☐ SCREENING ☐ FEEDING
☐ MECHANICAL DEN & EXCAVATORS ☐ ELEVATING & CONVEYING

I am interested in a new unit ☐ conversion ☐

Desired capacity is _____

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

Forest Fertilized at Rutgers

A WHOLE new market for the fertilizer manufacturer and more business for custom applicators may develop from the new practice of forest fertilization, according to the Rutgers Extension Service.

In September, 12-12-12 fertilizer was applied by air to an 11-acre stand of red pine at the Rutgers University Dairy Research Farm, Beemerville, N. J., by Rutgers Forestry Dept. and Nitrogen Div., Allied Chemical & Dye Corp. It is believed to be the first such application ever made.

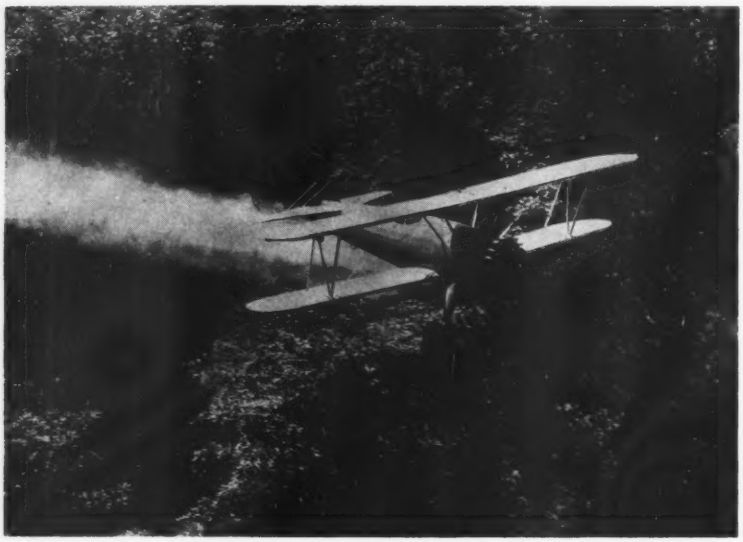
Purpose of the experiment is to improve the growth of the 28-year-old trees that are growing slowly because of low fertility soil, said John Andresen of the State University Forestry Dept.

Recent tests of fertilizing trees have indicated increases in growth ranging from 40 to 65 per cent. Current, larger-scale work is being directed toward improvement of the fertilizing technique, which could lead to more abundant, cheaper wood for the pulp and paper industries.

The fertilizer was applied at the rate of 400 pounds an acre by a crop-dusting Stearman airplane operated by Cherry Dusting Service of Pemberton.

Measurements of the fertilized trees will be made after each growing season to determine the extent of their response to the fertilizer. Other experiments have shown that well fertilized trees are greener, have longer needles and are more healthy in general than trees growing without sufficient plant food.

Stearman crop-dusting plane applies 12-12-12 at the rate of 400 lbs. an acre at the Rutgers University Dairy Research Farm, Beemerville, N. J.



Stock Plan Offered To Dow Employees

Dow Chemical Co. in October offered 150,000 shares of common stock to its employees and those of its subsidiaries and domestic associated firms at $60 per share.

Eligible employees may subscribe for stock up to 10 per cent of their annual wage. Directors of the company are excluded from the plan, but other employees on the payroll Sept. 20 were eligible to subscribe.

W. German Firm to Bid on Korean Plant

West German corporations are reported interested in participating in the construction of the second and third $20 million fertilizer factories in South Korea. When bids are called for, Lurgi Gesellschaft fuer Chemie und Huettenwesen mbH, of Frankfurt, expects to submit a bid. At least two other West German firms are said to be interested in the South Korean capital goods business.

Since German prices often are lower than those of the United States, prospects for their sales in the South Korean market seem favorable.

Questions & Answers on Operations Research

Reprints of an article titled "Management Can Understand Operations Research" are available from Operations Research Institute. Using question and answer technique, the article explains linear programming, which industry is using to simplify and improve such operations as inventory control, production scheduling, sales forecasting, transportation scheduling, etc.

For copies, write to the institute at 41 Fifth Ave., New York City 3.

Fire at Pennsalt Mexico City Plant

A fire is reported to have completely destroyed a Pennsalt sulfur mill in Mexico City on Sept. 19, despite the efforts of a hundred firemen from three companies, who battled the blaze for four hours.

Meet The Demand For High Analysis

Use

DAVISON'S

TRIPLE

Superphosphate

State Agricultural Experiment Stations and other authoritative sources are recommending fertilizers with ever increasing plant food units per ton. High analysis fertilizers are in demand because they give more for each fertilizer dollar. Meet this demand by incorporating Davison's *New* Triple Superphosphate in your formulation.

Davison's Triple Superphosphate has 45/46% available P_2O_5 and is supplied in the easy-to-use granulated form or run-of-pile.

Order Davison's Triple Superphosphate. For complete information, call or write.

Progress Through Chemistry

DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co.

Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, TRIPLE SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS AND SILICOFLUORIDES. SOLE PRODUCERS OF DAVCO® GRANULATED FERTILIZERS.

. . . Business & Management

N. Div. Management Development Program

Nitrogen Div., Allied Chem. & Dye Corp., planned to get underway last month on a remodeled Management Development Program and Foreman's Training Program.

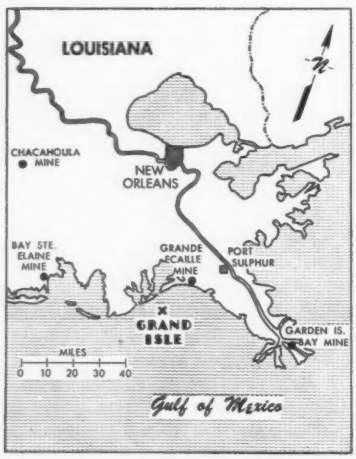
Training for both programs will emphasize the role of supervisory proficiency in reducing the unit cost of producing the division's products. In addition, this year's activities of the original development program will deal with methods for appraising performance of those in supervisory or management positions.

The Foreman's Training Program is set up as a formalized orientation to bring foremen abreast of new techniques in the practices of supervision, the division reported.

Freeport Undertakes Offshore Sulfur Mining

The first completely offshore sulfur mining operation in history will be undertaken by Freeport Sulphur Co. at a deposit discovered in the Gulf of Mexico by Humble Oil & Refinery Co., Freeport has announced.

Under a contract signed by the two companies, Freeport will design, install and operate a mining plant to produce sulfur by the Frasch hot water process. Construction is required to begin by the latter part of 1958.



Freeport will build the plant at the Grand Isle deposit, located off La. in 45 ft. of water. The firm now mines sulfur from four other coastal deposits, indicated by dots.

Income Has Less Effect on Fert. Sales

The amount of farm income seems to affect fertilizer consumption much less than it has in past years. USDA says that farmers are becoming more aware of the necessity of renourishing their soils. When income is less they will continue their plant food investment, and decrease their spending for other things.

Monsanto Adds Sect. For Ag Chem Sales

Monsanto Chemical Co. has announced that separate sales sections for agricultural chemicals and for industrial chemicals have been organized within the Sales Dept. of the Inorganic Chemicals Div. Concurrently, organization of the division's Research Dept. has been aligned to provide strengthened research activity, particularly in phosphorus and nitrogen products.

In the agricultural sales section, S. R. Clement has been named director of sales, and Leroy Donald, director of sales development. Two assistant directors were appointed: Bernard Machen, in charge of district offices, and R. W. Goldthwaite, in charge of agricultural products. M. F. Walsh is manager of product sales and Roy Spence, manager for direct application of ammonia products.

The new alignment in the division's Research Dept. includes four research groups under Dr. Marion D. Barnes as assistant research director. Dr. J. G. Stites is group leader for fertilizer materials study; L. E. Loveless heads a group concerned mainly with plant and animal nutrition; A. P. Wood is responsible for fertilizer analytical work and Robert T. Webber heads a group charged with developing plant food processing data for its fertilizer manufacturing customers.

IMC Yearly Earnings Down, 4th Quarter Up

Net earnings after taxes of International Minerals & Chemical Corp. for the fourth quarter of its fiscal year ended June 30 were $2,731,483, a 23 per cent increase over fourth quarter earnings of the previous fiscal year.

Net sales for the fourth quarter amounted to $30,422,955, a 12 per cent increase over $27,096,753 for the same period in 1955.

For the fiscal year ended June 30, earnings after taxes were $5,401,723, a decrease from the $6,321,903 recorded for the previous fiscal year.

In the corporation's annual report, Louis Ware, president, said that the year was an abnormal one for the firm, primarily because of the industry-wide strike in the Florida phosphate fields.

Portland, Ore., Office Opened by US Borax

United States Borax & Chemical Corp. has opened a new office in Portland, Ore., to handle development and sales of plant food borates in the Pacific Northwest. Glen L. Holt has been assigned to this office and is already operating in the area.

GRAFLOW means . . .

- reduced caking
- lower curing temperatures
- better flowability
- reduced wear and corrosion
- improved drillability

NEW . . . GRAFLOW (Trade Mark)

FERTILIZER CONDITIONING AGENT

Here is the new conditioner that can give any pulverized or granular fertilizer a number of advantages. First, in your own plant, GRAFLOW will reduce corrosion of your handling equipment, because it is chemically inert. It will mix and coat evenly because it is basically high quality graphite . . . one of nature's finest lubricants. In addition, GRAFLOW has high coating power. The inert graphitic film isolates fertilizer particles from one another, lowering inter-granular friction. Thus, you benefit two ways with GRAFLOW: your own plant handling is aided, and your product gains greater acceptance. This is a new product, well worth an inquiry for details . . .

✱ write our Chemical Development Department for complete information.

222

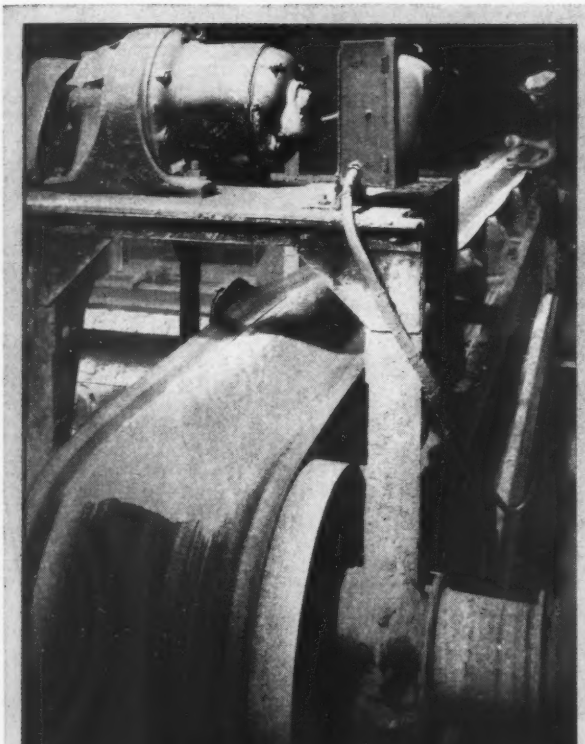
THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

Even after months of storage . . .

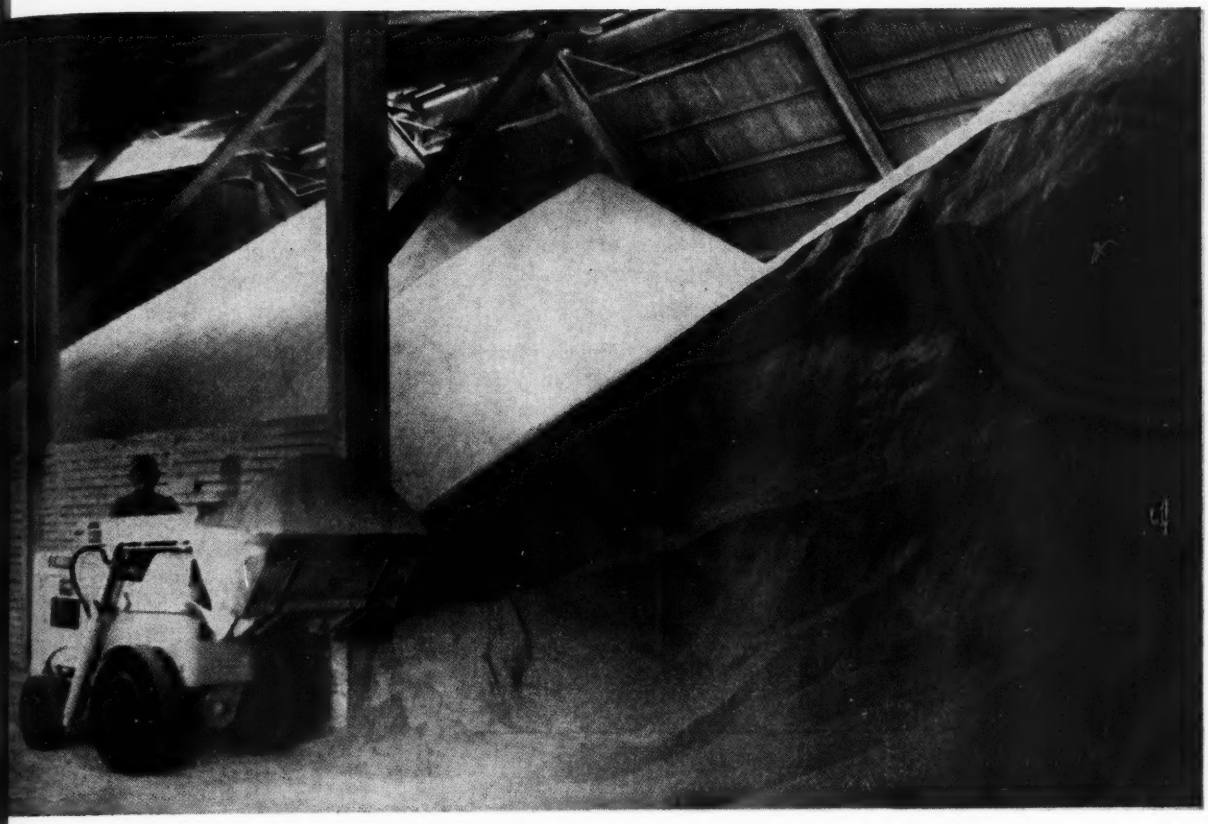
"Your triple crumbles like a cookie"

Mr. A. H. ROFFERS, *General Manager* (left) and Mr. W. E. JONES, *Manager* of the Fertilizer Division, Northwest Co-op Mills, Inc., St. Paul, report storing up to 7,500 tons of triple without adverse results.



International's triple goes into more than 20 different mixed fertilizers formulated by the Northwest Co-op Mills. Mixed goods are conveyed by belt to one of 26 bulk storage bins.

Mixed goods produced in the two plants are bagged and sold under the Northwest Co-op name. The fertilizer division, along with feed and seed divisions, serves farm customers in a 5-state area.



"... and saves us 50% on shipping costs"

LIKE all fertilizer manufacturers, Northwest Co-op Mills, Inc., are interested in a top-quality triple that stores with a minimum of setting up. In addition, they want to keep a tight rein on triple super shipping costs.

That's why this modern midwestern firm is an enthusiastic user of International's triple in their two plants at Winona, Minn., and Green Bay, Wis.

"We can store as high as 7,500 tons at a time, and the triple keeps in good condition," says Bill Jones, manager of the co-op's fertilizer division.

The triple goes into more than 20 different fertilizer formulas for co-op customers in Wisconsin, Minnesota, Iowa and the Dakotas.

And International helps hold shipping costs to a minimum too. "We realize 50% savings in transportation costs by International's system of barge shipments through the Gulf of Mexico and up the Mississippi River to Winona," adds Jones.

These big savings in shipping costs are made possible by International's new concept of fast, efficient service. Here's how International's barge shipments, combined with an "on-site" warehousing plan, can help you realize big savings in shipping costs too.

By warehousing triple at storage points located in primary marketing areas, International can assure quick service . . . relieve off-season storage loads at your plant site . . . provide better distribution during peak season.

This new warehousing program includes storage facilities in the St. Paul-Minneapolis area, and three proposed storage sites to be located in key transportation centers. In the areas served by these points, this new service will mean quick, dependable delivery . . . ranging from 24 hours to 3 days.

If you are not already an International user, put us to the test.

You'll find that International's is the triple with built-in extras that help you cut costs. Natural-curing for a minimum of 5 weeks gives you better control of manufacturing conditions . . . helps simplify your formulation problems. And you'll get the extra benefits of a guaranteed constant minimum of 46% APA.

Write or wire International Minerals & Chemical Corporation for full information on prices, shipping and warehousing arrangements.

MINERALS International CHEMICALS

PHOSPHATE CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago 6

. . . Business & Management

W. R. Grace Reports Increased Earnings

An increase of 11 per cent in net earnings per common share for the first six months of 1956 over the corresponding period in 1955 is announced by W. R. Grace & Co. Total net income amounted to $10,547,545 against $9,426,664 for the first half of 1955.

In his report to stockholders, J. Peter Grace, president, said that the Davison Div. enjoyed a "very satisfactory increase in sales and earnings from its industrial chemicals, but both this division and Grace Chemical Co. Div. suffered from a general weakness in the demand for agricultural chemicals." He added that Grace Chemical showed a marked increase over previous earnings.

Wholesalers Farm Supply Sales in '54

Sales of farm supplies wholesalers were $1.6 billion in 1954, up 31.6 per cent over 1948, according to preliminary results of the 1954 Census of Business conducted by the Bureau of Census, U. S. Dept. of Commerce.

At the end of 1954, there were 2,437 places of business in this country primarily engaged in buying and selling farm supplies at wholesale, compared with 1,538 at the close of 1948.

Arizona Sulphur Company Formed

Formation of Arizona Sulphur Co., with general offices in Los Angeles, Calif., recently was announced. A modern grinding mill, with a capacity of 25 tons finely ground dusting sulfur per day, has been installed in Glendale, Ariz.

Medley

President of the new concern is Harry A. Medley, also president of United Sulphur Corp. Medley reports that the company's product will be sold to manufacturers in Arizona.

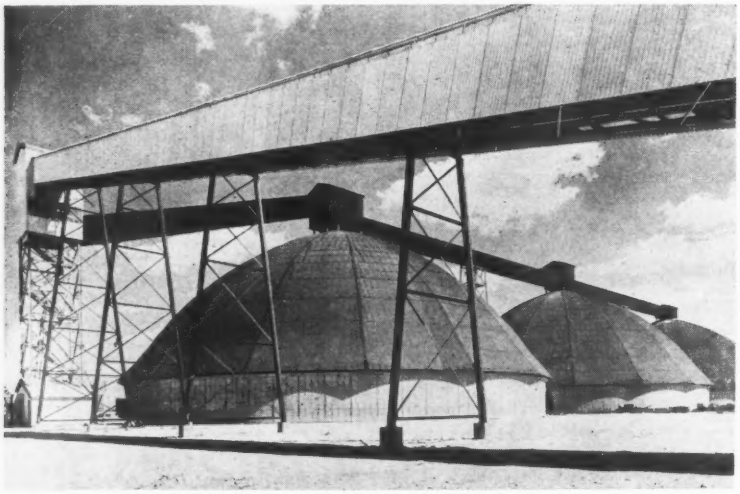
Nat. Potash to Ship in Feb.

Construction work at National Potash Co.'s new mine near Carlsbad, N. M., is reported proceeding on schedule with shipments due to begin in February.

Richard C. Wells, president of the company which is jointly owned by Freeport Sulphur Co. and Pittsburgh Consolidation Coal Co., said that the two mining shafts are down to ore level, the 21-mile water pipeline is in operation, and the refinery and other facilities are nearing completion.

Annual capacity of the $19 million project will be 400,000 tons of high grade muriate of potash, guaranteed 60 per cent K_2O.

Product storage buildings at National Potash Co.'s mine have a capacity of more than 100,000 tons. Each measures 185 ft. in diameter and 90 ft. in height. Steel bowstring trusses support the Galbestos roof cover.



Dow Chem. Plans $75 Million Expansion

Dow Chemical Co. expects to spend more than $75 million for expansion during the current fiscal year, Dr. L. I. Doan, president, told stockholders recently.

Plant locations to be developed include Plaquemine, La.; Lee Hall, Va.; Hanging Rock, Ohio; and Riverside, Mo.

Columbia-Southern Ups Scholarships

Columbia-Southern Chemical Corp. has revised its annual four-year science and engineering scholarship program offered in its chemical producing plant towns at Barberton, O.; Natrium, W. Va.; Corpus Christi, Tex.; and Lake Charles, La., to allow future award winners increased tuition benefits.

Award winners now will receive scholarships valued at $2,000 plus four years' tuition.

Sales Clinic Held Oct. 15

IF chemical salesmen would learn how to think and talk from the viewpoint of their individual customers, they would be confronted with fewer sales obstacles. This view was voiced by J. Douglass Kirk of the Sales Analysis Institute of Illinois in an address before the fifth annual Chemical Sales Clinic sponsored by the Salesmen's Assn. of the American Chemical Industry at the Hotel Commodore on Oct. 15.

Appearing on the morning program with Kirk were Werner C. Brown, director of sales for the Cellulose Products Dept. of Hercules Powder Co.; C. H. Beard, general traffic manager of Union Carbide & Carbon Corp. and Francis J. Curtis, vice president for personnel, Monsanto Chemical Co.

Among the things that stand in the way of sales are customer habits, fear, price, competition, lack of information and difficult personalities, Kirk continued. To overcome them, "you must show them how their conditions can be sufficiently improved by your idea."

Planning Ahead

W. C. Brown, in his presentation "Planning Ahead for Your Sales Day," urged salesmen to plan ahead if they wish to achieve maximum efficiency and productivity. Only through conscious planning, he declared, can a salesman make fullest use of his most valuable asset—time.

A planned sales program, Brown explained, has three major parts —the long range plan covering any convenient period from three months to five years, the short-range phase which is generally for a week's schedule and the immediate plan covering face-to-face contact with the buyer.

He maintained that a well-planned call should never be made "without thorough knowledge of the customer's past purchasing record, of recent complaints, of special requirements or considerations which must be met."

Brown felt that too little attention is given to the final phase—the interview with the buyer. A salesman should consider, he suggested, "how to present the pertinent facts, at what point to make key observations, in what sequence to ask questions and, most importantly, the plan to bring the sales discussion to a prompt and satisfying conclusion."

Ants In Plants

Bandini Fertilizer Co. is reported to be advertising in newspapers its new product with insecticide added. Featuring a series of beautiful girls, the ads are captioned: "You'd never guess—I once had ants 'n my plants."

Transportation Problems

Handling of transportation problems should be left to experts, advised C. H. Beard. The chemical salesman should learn all he can about the subject, but not be a traffic manager himself.

Beard pointed out that the traffic department tries to serve the sales department "in broadening markets for manufactured products and in extending competitive penetration." He urged the chemical salesmen to refer terms and conditions in sales contracts to the traffic manager to find out whether he can operate under them without difficulty.

Speaking at the luncheon, Carter L. Burgess, assistant Secretary of Defense, asked chemical firms to support the Defense Dept.'s special programs for development of a reserve of technically trained men, both in the interests of our defense, and for their own self-interest.

Three panel discussions were held during the afternoon meeting, on "The Supervision of Salesmen Without Interference," "The Value of Communications Between Sales and Management" and "How the Chemical Salesmen Can Improve the Re-Seller-Manufacturer Relationship."

So. Pesticide Group Meets in Pinehurst

Members attending the Carolinas-Virginia Pesticide Formulators Association meeting, held Oct. 8–10 at the Holly Inn, Pinehurst, N. C., elected J. M. Maxwell of Maxwell Insecticide Co. their president for the coming year.

Serving with him are George Simches, Planters Chemical Corp., vice president; John Daly, Daly-Herring Co., vice president; and W. R. Peele, W. R. Peele Co., secretary-treasurer.

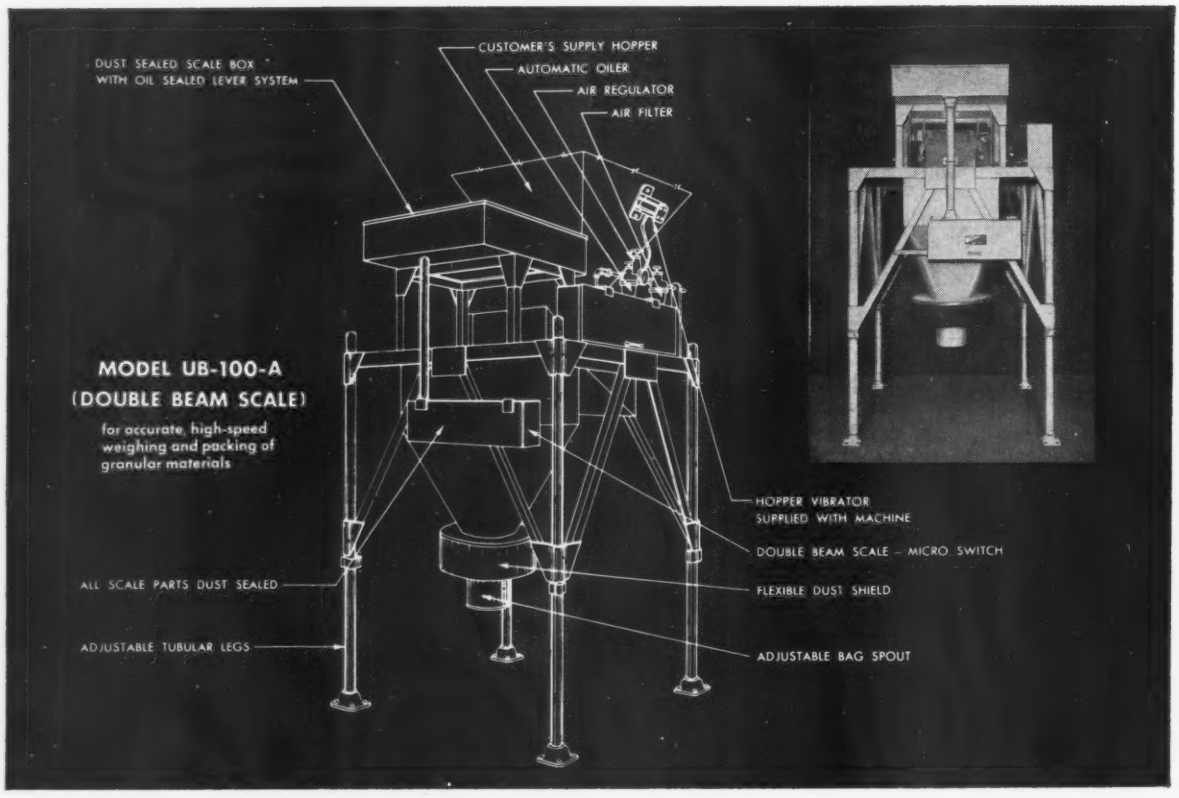
At the annual banquet in the Holly Inn Ballroom, Harold D. Cooley (D.,—N.C.), Chairman of the House Committee on Agriculture told the group his views on "What the Soil Bank Could Mean to the Agricultural Chemical Manufacturer."

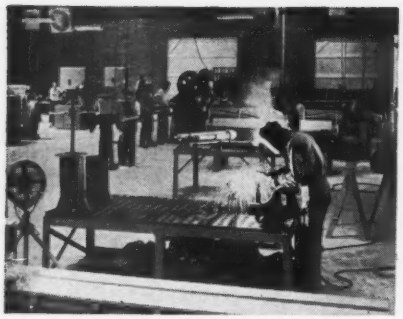
Dr. Clyde F. Smith predicted "Bug Problems of the Future" during the morning session on Oct. 9, and a film titled "The Rival World" was presented. On the following day, Dr. George Ferguson of Geigy Agricultural Chemicals told delegates of "New Developments in Herbicides."

Recreation and sports activities, besides the banquet, included a reception and golf matches, and a bridge luncheon for the ladies.

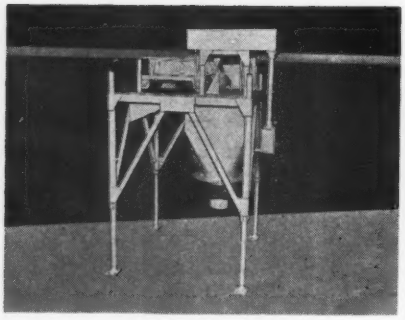
"Fertilizer manufacturers! Our savings have been so impressive we have installed five additional machines."

"SINCE WE CONVERTED INCREASED SAVED 67%

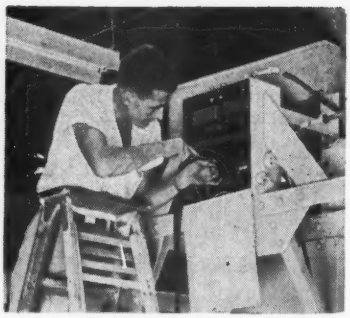

DUST SEALED SCALE BOX WITH OIL SEALED LEVER SYSTEM
CUSTOMER'S SUPPLY HOPPER
AUTOMATIC OILER
AIR REGULATOR
AIR FILTER
MODEL UB-100-A
(DOUBLE BEAM SCALE)
for accurate, high-speed weighing and packing of granular materials
HOPPER VIBRATOR SUPPLIED WITH MACHINE
DOUBLE BEAM SCALE – MICRO SWITCH
FLEXIBLE DUST SHIELD
ALL SCALE PARTS DUST SEALED
ADJUSTABLE TUBULAR LEGS
ADJUSTABLE BAG SPOUT



THE PLANT THAT DEMAND BUILT—Union's I & C Bagger is manufactured in this new Inglett & Corley plant, located in Augusta, Ga. Substantially increased capacity insures prompt delivery of all models.



SIMPLIFIED INSTALLATION—Shipped completely factory assembled and checked. Can be installed in hours. Adjustable legs may be compacted. Unit can be readily moved into position and quickly adjusted to the supply hopper.



TRAINED UNION TECHNICIANS—The I & C Bagger is installed and serviced by Union machinery experts. These technicians are based so that they are available for immediate assistance if needed.

TO UNION'S I & C BAGGER, WE HAVE PRODUCTION BY 50%, ON LABOR"

C. L. Durham
Plant Superintendent
Dixie Guano Co., Laurinburg, N. C.

"The I & C Bagger has enabled us to up production to 50 to 60 tons of fertilizer per hour, compared to 35 to 40 tons in the past," says Dixie Guano plant superintendent C. L. Durham, "and we've been able to do it with one weighing operator instead of three. The I & C is as fast and efficient a bagger as I've ever encountered. Its performance has been little short of sensational."

PEAK PRODUCTION

Dixie Guano's I & C installation has given the company's Laurinburg, N. C., plant an average production rate of 16 to 17 100-lb. Multiwalls per minute. "That's as fast as a man can get bags under the spout," says Mr. Durham.

GAINS FOR OTHER FERTILIZER MANUFACTURERS

Fertilizer companies who have seen the I & C Bagger in operation have bought more than 200 units in the past two years. Regardless of the size of their plants, manufacturers have found that the I & C Bagger reduces packaging labor costs, increases production, and can bring about important economies in the cost of the Multiwall bags themselves.

SEE THE PROOF!

Ask for details on how one small plant is saving over $50 a day in reduced manpower and increased production with a single machine . . . why a major producer has installed a dozen I & C Baggers . . . why another leading manufacturer has converted nine plants to the I & C.

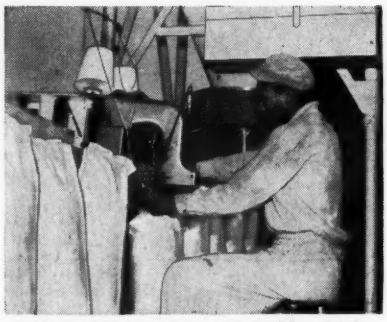
Almost certainly, the same opportunities for greater packaging efficiency are present in your own company. Get the facts today.

ACCURATE, HIGH SPEED OPERATION

The I & C Bagger used by Dixie Guano, Model UB100-A—works in conjunction with a moving conveyor and sewing head.

The weighing and filling cycle is completely automatic. It begins when the bag filling operator pushes the starter button. This automatically delivers the fertilizer through the bag spout into the bags in an endless series of pre-weighed charges.

The filled weight drops each of the open mouth multiwall bags on to the moving conveyor which carries them to the sewing head.



UP TO 20 100-LB. BAGS A MINUTE! New high-speed packaging for the fertilizer industry! Twenty 100- or 50-lb. Multiwalls per minute; 400 to 500 tons in an eight-hour day. Completely automatic filling and weighing cycle.

union camp

PACKAGE ENGINEERING DEPARTMENT

I&C Bagger

Automatic Weighing and Filling Machine for Open Mouth Bags

Manufactured by **INGLETT & CORLEY, INC., AUGUSTA, GA.**

Exclusive Sales Agents:

UNION BAG-CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK

S-D To Operate Tex. City Chem.

THE U. S. District Court for the Southern District of Texas has agreed to entertain a reorganization petition for Texas City Chemicals, Inc., based on a plan submitted by Smith-Douglass Co., Inc., S-D president Ralph B. Douglass revealed last month.

Pending its consideration by the Court, the plan contemplates that Smith-Douglass will reopen and operate the plant of Texas City Chemicals as agent for the Court's Trustee, and that Smith-Douglass will participate in the reorganization proceedings on a basis which would result in its becoming the controlling stockholder of Texas City Chemicals when and if a reorganization plan is consummated. Douglass said that the S-D plan had been tentatively accepted by a number of the creditors of TCC.

A number of matters still have to be worked out before S-D participation becomes binding. Details of the arrangement whereby Smith-Douglass would operate the plant or participate in the reorganization plan were not stated. Through F. Eberstadt & Co., New York investment counselors, arrangements have been effected to refinance TCC in the event Smith-Douglass participation in reorganization is confirmed.

Texas City Chemicals completed a large dicalcium phosphate plant at Texas City, Tex., in 1954, soon after which the firm encountered financial difficulties which resulted in halting of operations in January, 1956. The firm also has facilities for producing sulfuric acid and phosphoric acid.

Personnel from Smith-Douglass flew to Texas City early in October to commence plant start-up operations. D. C. Kieffer, technical director, will be in overall charge of production, assisted by W. O. Johnson and Howard C. Hendron. Herbert Britain, home office budget section supervisor, has been transferred to establish a financial section.

Soil management for <u>your</u> region. . .

FARM SOILS
Their Fertilization and Management
SECOND EDITION

By EDMUND L. WORTHEN *and* SAMUEL R. ALDRICH, *both of Cornell University*.

Farm Soils is a work outstanding for its clear, practical approach. The authors relate soil management to the goal of economic crop production, discussing the *specific* soil areas in many states. Three-hundred-and-thirty clear illustrations and maps, plus full color plates of 10 nutrient-deficiency symptoms are included.

The new edition . . .

- is completely rewritten and re-organized
- adds a chapter on soil maps, land judging, and soil classification
- presents more information on tilth and tillage
- describes soil areas within many states
- features a new chapter on soil management for each important crop
- includes 220 new illustrations

1956. 439 pages. 330 illus. $4.96.

For Sale by: **FARM CHEMICALS**
317 N. Broad St. Philadelphia 7, Pa.

O-M Research Grant

The University of Missouri has received a research grant of $7,500 from Olin Mathieson Chemical Corp. in support of fundamental research to be conducted in the Dept. of Soils, College of Agriculture. The three year study called "A Study in Energetics of Ionic Relationships in Soils and Plants," will be under the direction of Dr. C. Merrill Woodruff, associate professor of soils. The project is under the over-all supervision of Dr. W. A. Albrecht, chairman, Soils Dept.

Horsfall Authors Book on Fungicidal Action

Principles of Fungicidal Action by James G. Horsfall. Publishers—Waltham, Mass.: The Chronica Botanica Co.; New York City: Hafner Publishing Co. $6.50.

Professor Horsfall brings together information on mechanisms of fungicidal action and strives to distinguish, at all points, between permeation and inherent toxicity.

Described are the physics and chemistry of protection and mechanisms of fungitoxicity that underlie successful protection. There are sections dealing with dithiocarbamates, quinones, imidazolines and trichloromethylthiophthalimidine.

PEOPLE

American Potash & Chemical Corp. Jerry J. Barry has been named to the new position of personnel and office manager at the Los Angeles plant. He had been assistant to R. B. Coons, vice president, administration.

Atlas Powder Co. Adrian J. Stewart, technical representative in charge of the chemical sales office in Atlanta, has been transferred to the Atlas International Chemical Sales Dept. in Wilmington. He is succeeded at Atlanta by R. L. Herrman, Jr.

Carbide and Carbon Chemicals Co. James H. Jones joins Crag Agr. Chemicals Div. as a technical representative.

Columbia-Southern Chemical Corp. Appointment of

Grant

Charles E. Grant to the newly-created position of manager of solvent sales recently was announced. Grant will be responsible for C-S sales of trichlorethylene, perchlorethylene, mono-chlorobenzene, ortho-dichlorobenzene and para-dichlorobenzene.

Dr. William G. Krochta and Donald A. Reich have been assigned to the C-S Barberton, Ohio, chemical producing plant as senior research chemists.

Commercial Solvents Corp. has announced it will launch a major expansion of its agricultural chemical sales and customer service in the midwest for the 1956–57 fertilizer season.

R. W. Breidenbach has been named midwest sales manager to direct the expanded effort. The former assistant general manager of agricultural chemical sales will make his headquarters at CSC's district office in St. Louis, Mo.

Breidenbach

Dr. David Howe has joined the firm's research development and engineering staff at Terre Haute, Ind.

CSC has named Walter M. Young to its marketing and distribution organization, to cover Texas, Oklahoma and parts of Arkansas and Louisiana. Young formerly was manager of Hi-Yield Plant Food Co.

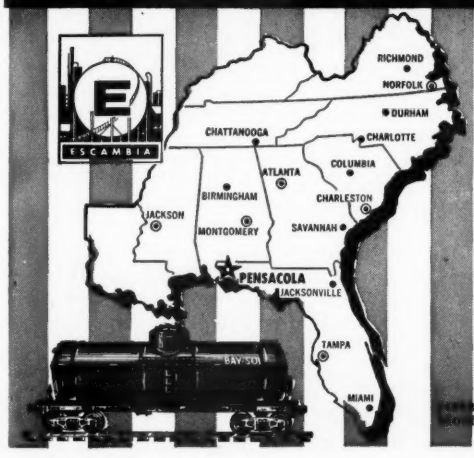
Young

Escambia Chemical, a Bright, New Name in Nitrogen

"BAY-SOL" NITROGEN SOLUTIONS

ANHYDROUS AMMONIA

AMMO-NITE AMMONIUM NITRATE FERTILIZER—33.5% NITROGEN



MORE IN SERVICE, MORE IN QUALITY

Technical service field representatives, to aid you with any problem, are as near as your telephone.

Modern, easily accessible manufacturing plant and continuing research.

Conveniently located service offices.

Strong supporting advertising in newspapers, farm magazines and other media.

Manufactured by

Escambia Chemical Corporation

Pensacola, Florida

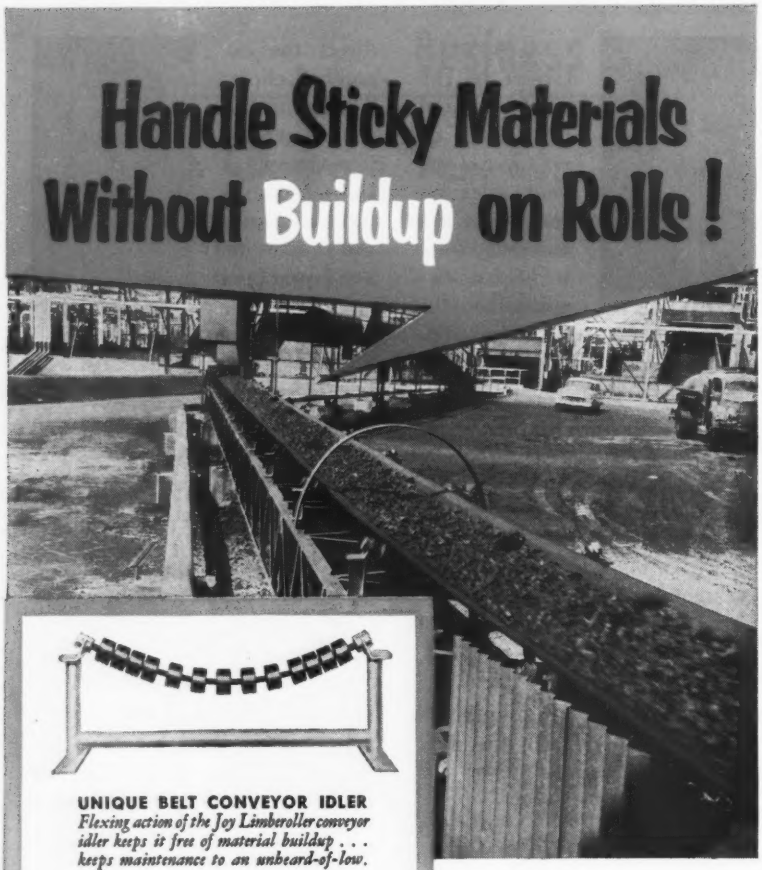
Distributed Exclusively by

Ashcraft-Wilkinson Company

Atlanta, Georgia

DISTRICT OFFICES: Norfolk, Va., Charleston, S. C., Tampa, Fla., Jackson, Miss., Montgomery, Ala., Columbus, Ohio, Des Moines, Iowa.

Handle Sticky Materials Without Buildup on Rolls!



UNIQUE BELT CONVEYOR IDLER
Flexing action of the Joy Limberoller conveyor idler keeps it free of material buildup . . . keeps maintenance to an unheard-of-low.

Belt conveyor maintenance can be a real headache when sticky chemicals and fertilizers start gumming up the idlers. The unique Limberoller belt conveyor idler is completely flexible—made of resilient molded neoprene discs on a flexible steel cable. This flexing action breaks loose any material building up on the rolls—makes maintenance dive 30% to 90%.

The Limberoller has already given over *12 times the service life* of conventional idlers in many applications—proved extremely effective in handling triple superphosphate, ammonium sulphate, and sticky fertilizers.

The Joy Limberoller also resists dust, abrasion, and corrosion . . . no bearing trouble because only two bearings are used and these are up out of the dirt zone. Get details from *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Co. (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 131-77

Consult a Joy Engineer

For Air and Gas Compressors, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors, Oil-Free Compressors.

WSW 1-6319-131

JOY

SINCE 1851 . . . OVER 100 YEARS OF ENGINEERING LEADERSHIP

. . . People

Davison Chemical Co. New member of the Dept. of Agricultural Chemical Research is R. W. Starostka, former soil scientist with USDA's Fertilizer and Agricultural Lime Section.

Diamond Black Leaf Co. Appointment of Bruce L. Haddock as assistant merchandising manager is announced. He already has assumed his duties, assisting Clark M. Munger, merchandising manager, in furthering the company's distributor-dealer program.

Escambia Chemical Corp. Two new Plastics Div. sales representatives: William F. Christie, Middle Atlantic states; and James M. Martin, New England states.

Food Machinery & Chem. Corp., Chemical Divs. Dr. Borivoj R. S. Franko-Filipastic is named process section supervisor and Dr. Harold K. Latourette becomes exploratory section supervisor in the Organic Chemistry Dept. of FMC Chemicals Central Research Center.

Formation of an FMC Organic Chemicals Div. to take care of the corporation's expanding interests and activities in organic chemicals and plastics is announced. Henry S. Winnicki becomes president and manager of the division with headquarters in New York.

Winnicki

W. R. Grace & Co. Richard L. Moore has joined the public relations div., responsible for public relations of Grace Chemical Co. Div. and the Polymer Chemicals Div.

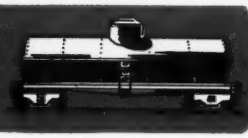
(*to page 22*)

5 PHILLIPS Fertilizer Materials for High Analysis Mixtures

1 Ammonium Sulfate

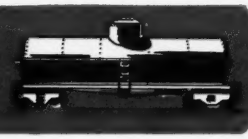
New Premium Quality Phillips *66* Ammonium Sulfate contains 21% nitrogen, 23.8% sulfur. It is *dry*-cured to remove excess moisture, prevent caking. Uniform dust-free crystals flow freely, mix easily. Ideal for all analyses of mixed goods and for direct application. Available in bags or bulk.

2 Anhydrous Ammonia



Phillips *66* Agricultural Ammonia contains 82% nitrogen. It's a convenient, economical source of nitrogen for mixed goods formulation. Tank car shipments are assured to Phillips contract customers by Phillips huge production facilities in the Texas Panhandle and at Houston, Texas.

3 Nitrogen Solutions

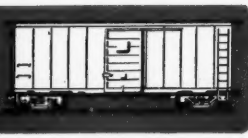


Get more N per dollar! There are three Phillips *66* Nitrogen Solutions for use in preparation of high-analysis fertilizers and the ammoniation of superphosphate. These solutions keep manufacturing costs low; help rapid, thorough curing.

4 Ammonium Nitrate

Phillips *66* Prilled Ammonium Nitrate contains 33.5% nitrogen. The small, coated prills resist caking, handle easily. Depend on Phillips *66* Prilled Ammonium Nitrate for free-flowing uniform properties and top-notch crop response as a direct application material. It's an ideal companion high nitrogen fertilizer for quality mixed goods.

5 Triple Superphosphate



Phillips *66* Triple Superphosphate contains 46% available phosphoric acid. Ideal for use in formulation of high-analysis fertilizers.

PHILLIPS CHEMICAL COMPANY

A Subsidiary of Phillips Petroleum Company, Bartlesville, Oklahoma

Phillips 66

ATLANTA, GA.—*1428 West Peachtree Street*
AMARILLO, TEX.—*First Nat'l Bank Bldg.*
BARTLESVILLE, OKLA.—*Adams Bldg.*
CHICAGO, ILL.—*7 South Dearborn St.*
DENVER, COLO.—*1375 Kearney Ave.*
DES MOINES, IOWA—*6th Floor, Hubbell Bldg.*
HOUSTON, TEX.—*1020 E. Holcombe Blvd.*
INDIANAPOLIS, IND.—*1112 N. Pennsylvania St.*
KANSAS CITY, MO.—*500 West 39th St.*
MINNEAPOLIS, MINN.—*212 Sixth St. South*
NEW YORK, N. Y.—*80 Broadway*
OMAHA, NEB.—*WOW Building*
PASADENA, CALIF.—*330 Security Bldg.*
RALEIGH, N. C.—*804 St. Mary's St.*
SALT LAKE CITY, UTAH—*68 South Main St.*
SPOKANE, WASH.—*521 E. Sprague*
ST. LOUIS, MO.—*4251 Lindell Blvd.*
TAMPA, FLA.—*3737 Neptune St.*
TULSA, OKLA.—*1708 Utica Square*
WICHITA, KAN.—*501 KFH Building*

. . . People

Grand River Chemical Div., Deere & Co., has appointed Tom H. Stewart as technical service manager. Previously he was with the International Minerals & Chemical Corp. Fertilizer Div.

Stewart

International Minerals & Chem. Corp. Jack von Mettenheim becomes sales representative in the Midwest for the Potash Div. An IMC employee since 1953, he received a degree in agricultural management from Halle University, Germany, in 1939.

von Mettenheim

Klau-Van Pietersom-Dunlap, Inc., Agricultural Div. Robert D. Nord and John D. Finley are new account executives, and Karl F. Ohm, creative and copy man.

Pennsylvania Salt Mfg. Co. Dr. Howard I. Cramer has been named director, technical liaison, for Pennsalt Chemicals.

Smith-Douglass Co. J. R. Stiffler has been named advertising manager, responsible for coordination of advertising and sales promotion of the firm's divisions which include Coronet Phosphate Co., Smith-Rowland Co., and San Jacinto Chemical Co.

Spencer Chemical Co. has designated William A. Sime agricultural chemical sales representative for Ohio, and transferred Thomas L. Campbell from Mississippi to North Carolina.

Sime, who replaces Robert Farrow, will make his home in Columbus. Prior to his new assignment, he handled agr. chemical sales orders at Spencer's general office in Kansas City.

Sime

Campbell

Campbell, a graduate of Alabama Polytechnic Institute, had been agricultural sales representative in Mississippi.

Stauffer Chemical Co. The Hammond, Ind., plant of Stauffer Chemical Co. has recently added Billy Dean Scallorn, a chemical engineer, to its technical staff.

U. S. Industrial Chemicals Co. Tom E. Martin has been appointed field service engineer for USI's Chemical Sales Dept. During the past four years he has been director, Engineering Service Div., Snyder Chemical Co. He will locate in the Midwest near the firm's Tuscola, Ill., plant.

Martin

Velsicol Chemical Corp. Recent addition to the Western Div. staff is Jack Lomax, entomologist. Working under the direction of George Weldon, manager of agricultural chemical sales on the West Coast, he will handle technical problems and contacts with colleges and experiment stations.

Lomax

James Wirwille, former agr. chem. sales representative in the Midwest, has relocated to represent the firm in the Southeast. With headquarters at 3215 Kline Ave., Columbia, S. C., he will serve North Carolina, South Carolina, Virginia and part of Georgia.

Wirwille

Virginia-Carolina Chemical Corp. William H. Wilson, 40-year-old executive from New Orleans, has been designated as new president of V-C. He has been executive vice-president of Standard Fruit and Steamship Co. Concurrently, it was announced that William C. Franklin, who has been serving as acting president, has become permanent chairman of the board. Franklin succeeds former Gov. John S. Battle as board chairman. Battle will continue to serve as a member of the board.

Wilson

Wilson said that he did not intend to make any personnel changes, but indicated that some additional people may be brought in to supplement the V-C staff.

Wilson & Geo. Meyer & Co. personnel advancements: John M. Hooper, manager of the Portland office, to manager of agr. chemical sales in the Pacific Southwest; Clifford S. Culley, of the Los Angeles office, to manager of the Portland office, succeeding Hooper; and Thomas H. Lathe, to manager of the newly formed Market Development Dept., Pacific Southwest territory, with headquarters at Los Angeles.

FOR A LONG, LONG TIME

TENNESSEE CORPORATION

TRIPLE SUPERPHOSPHATE

Fine Texture, Small Particle Size For Maximum Ammoniation-Granulation

RIGID QUALITY CONTROL
Through Six Basic Chemical and Physical Analysis

HIGH WATER SOLUBILITY
High Water Solubility is a Characteristic of all 3 Grades

RUN-OF-PILE
Fine Texture, Highest Porosity, Large Surface Area, Small Particle Size, for Maximum Ammoniation-Granulation.

GRANULAR
Dust Free, Free Flowing, Uniform Particle Size, Medium Hardness, No Bridging Over, for Direct Soil Application.

COARSE
For Intermediate Ammoniation to Produce a Semi-Granular Product. Also Affords Excellent Compatable Mixing with Granular Potash, for Minimum Segregation, in Alkaline Grades.

Thirty years ago when the use of Triple Superphosphate in the fertilizer industry was in its infancy, we produced our first run of Triple Superphosphate. Since that beginning we have been producing, and supplying this great and growing fertilizer industry with a Triple Superphosphate as fine as is available. Today in the country's largest and most modern Triple Superphosphate plants, we produce through pin-point control in step-by-step processing from the raw material to the finished product a triple superphosphate of:

FINE TEXTURE
SMALL PARTICLE SIZE
46% AVAILABLE P_2O_5
PRE-SHIPPING CONDITIONED

There's a BRADLEY & BAKER office near you. Their representative would be pleased to consult with you on your requirements and to advise on your most convenient delivery routings.

U.S. PHOSPHORIC PRODUCTS
TAMPA, FLORIDA

Division TENNESSEE CORPORATION

SALES AGENT:
BRADLEY & BAKER
155 East 44th Street—New York 17, New York
DISTRICT SALES OFFICES:
Atlanta, Ga. Indianapolis, Ind. St. Louis, Mo.
Norfolk, Va.

Associations & Meetings

ASAE Program Planned for Dec. 12

Fertilizer industry members and agronomists have been invited to attend the meeting of the Power and Machinery Section, American Society of Agricultural Engineers, to be held on Dec. 12 in cooperation with the National Joint Committee on Fertilizer Application. Sessions will be held in the Edgewater Beach Hotel, Chicago.

With C. E. Guelle, vice chairman of the National Joint Committee presiding, the program includes presentations by Firman E. Bear, editor-in-chief, SOIL SCIENCE, Rutgers Univ.; H. B. Walker, professor emeritus, Dept. of Agr. Engineering, Univ. of Calif.; W. C. Hulburt, USDA; L. N. Wise and T. N. Jones, Miss. State College; W. R. Bone, Monsanto Chemical Co.; H. F. Miller and C. W. Gantt, USDA; R. L. Cook, Kirk Lawton, L. S. Robertson and C. M. Hansen of Mich. State Univ.

NATA to Hold Conf. for Aerial Applicators

The annual Aerial Applicators Conference of National Aviation Trades Association will be held Nov. 1–3 at the Chase Hotel in St. Louis, Mo.

John Neace of Marsh Aviation, Inc., who heads the Agricultural Activities Div. of NATA, has planned fewer subjects this year but says more time will be devoted to matters of major policy and overall industry concern. The agenda will include a review of an "Air Agency" idea being developed by CAA designed to raise the level of aerial operations and remove some of its current pitfalls.

Representatives of USDA will conduct a round table with industry representatives on improvement of contracts and contract operations. The group also will hear from Roy Allgyer, research coordinator of USDA's ARS, who will review "Aviation Research within USDA." Topic of Dr. C. Boyd Shaffer of American Cyanamid, is "Safety with Phosphate Insecticides."

Also scheduled is a review of cost accounting practices, maintenance matters, the approval of a national air applicators' survey and sessions on marketing.

No. Central Weed Control Conference

The Hotel Sherman, Chicago, will be headquarters for the North Central Weed Control Conference on Dec. 10–12.

Sectional programs are planned on field crops, botany and plant physiology, industrial weed control, turf, weeds, horticulture, regulatory and extension, and waterweeds & weed control in wildlife habitats.

Seven Panels on MCA Conf. Agenda

Seven panel discussions will be features of the Manufacturing Chemists' Association semi-annual meeting and winter conference to be held on Nov. 20 at the Statler Hotel, New York City. Topics include merchandising and marketing, government relations, science education, chemical industry finance, college recruiting, corrosion prevention and plastics.

Banquet speaker will be Clifford F. Hood, U. S. Steel Corp. president. George L. Parkhurst, vice president, Standard Oil Co. of Calif. and Gen. J. E. Hull, MCA president, will address the group during the luncheon.

Arrangements for the meeting are being handled by a committee headed by Hans Stauffer, Stauffer Chemical Co. president.

CFA to Convene at Coronado, Nov. 11-13

A review of "Costs, Markets and Prospects in the Fertilizer Industry" will be delivered by Dr. Philip Neff, of Planning Research Corp. and U.C.L.A. economics professor, at the 33rd annual convention of the California Fertilizer Association. About 600 are expected at the meeting, to be held in Hotel del Coronado, Coronado, Calif., Nov. 11–13.

Neff

Elmer Wheeler of Dallas, Tex., will speak on "Selling the Sizzle in the Fertilizer Business."

Wheeler

Rounding out the program developed on the theme, "Some Aspects of Fertilizer Industry Economics," will be a panel moderated by Dr. Daniel G. Aldrich, Jr., Univ. of Calif., which includes George Monkhouse, vice president, Shell Chemical Corp.; Ned Lewis, vice president, Wilbur-Ellis Co.; and J. Earl Coke, vice president, Bank of America.

Officers Named by Ill. Pest Cont. Assn.

George R. Chamlin, president, Continental Chemiste Corp., recently was named president of the Illinois Pest Control Assn. Serving with him are Charles O'Hara of Anderson Exterminating Co., vice pres.; Frank Jeremia, Lien Chem. Co., secy.; R. G. Prescott, Protex Service, treas.; and as directors, John Mock, Arwell, Inc.; S. A. Nielsen, Rose Exterminator Co. and N. S. Wheeler, Wheeler Exterminating Systems.

Calendar

Nov. 7-9. Agr. Ammonia Institute Annual Convention, Atlanta Biltmore Hotel, Atlanta, Ga.

Nov. 7-9. Pacific Northwest Plant Food Assn. Annual Convention, Harrison Hot Springs Hotel, Harrison Hot Springs, B. C.

Nov. 11-13. Calif. Fert. Assn., 33rd Annual Convention, Del Coronado Hotel, Coronado, Cal.

Nov. 13-15. New York State Insecticide & Fungicide Conf., and 9th annual Pesticide Application Equipt. conf., Bibbins Hall, Cornell Univ., Ithaca.

Nov. 19-20. Eastern Branch, Ento. Society of America, Hotel Haddon Hall, Atlantic City, N. J.

Nov. 19-20. Ohio Pesticide Institute winter meeting. Neil House, Columbus.

Nov. 27-28. Indiana Fert. Conf., Memorial Union Bldg., Purdue University, Lafayette, Ind.

Nov. 28. Okla. Fertilizer Dealers conf., sponsored by Okla. Plant Food Educ. Society, Okla. A & M College, Stillwater.

Nov. 29. Okla. Soils & Crops conf., Okla. A & M College, Stillwater. Okla,

Dec. 3-5. CSMA Annual Meet., Mayflower Hotel, Washington, D.C.

Dec. 6-7. Ala. Soil Fertility Society, Whitley Hotel, Montgomery, Ala.

Dec. 10-13. North Cent. Weed Control conf., Sherman Hotel, Chicago, Ill.

Dec. 13-14. Soil Fertility & Plant Nutrition short course, Univ. of Mo., Columbia, Mo.

Dec. 27-31. Ento. Society of America, Annual Meet., Hotel New Yorker, N.Y.C.

Jan. 23-25. Southern Weed conf., Bon Aire Hotel, Augusta, Ga.

Jan. 28-29. National Cotton Council, annual meeting, St. Louis, Mo.

Jan. 31-Feb. 1-2. Agr. Aircraft Assn. annual convention, Senator Hotel, Sacramento, Calif.

Feb. 4-6. Cotton States Branch, Ento. Society of America, Birmingham, Ala.

HIGH-K

MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade coarse and uniform Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

61 BROADWAY ★ NEW YORK 6, N. Y.

GOVERNMENT

TVA Ferts. & Munit. Run At Loss in '56

Tennessee Valley Authority reports that its fertilizer and munitions development program during the fiscal year ended June 30, 1956, was carried on at a net expense of $1,127,746, compared with a net income of $7,680 during the 1955 fiscal year.

CCC Investment

The investment of the Commodity Credit Corp. in price support programs on Aug. 31 amounted to $7,829,984,000, of which $2,463,146,000 was in loans outstanding, and $5,366,838,000, inventories.

On the same date in 1955, investment was $7,116,855,000; loans outstanding were $1,337,143,000 and inventories, $5,779,712,000.

$18 Million Paid Under Acreage Res.

Payments to farmers participating in the 1956 Acreage Reserve program of the Soil Bank totaled $18,087,212.76 in 39 states reporting through Sept. 28, USDA has announced.

Largest amount was reported by Iowa, $5,814,630.45, followed by Texas with $2,209,690.04 and Oklahoma, $1,791,478.95.

Hugh Thompson Goes to K-State

Hugh E. Thompson, entomologist with the Pennsylvania State Dept. of Agriculture, has been appointed an assistant professor of entomology in the Agricultural Experiment Station at Kansas State College, Manhattan.

Thompson has been making studies of insects which attack trees, shrubs and nursery stock, and will continue similar studies at K-State, working in close cooperation with the departments of horticulture, and botany and plant pathology.

Coop Membership Increases 1 Million

An increase of over a million members in marketing, supply and related service cooperatives, between the 1952–53 and 1953–54 fiscal years, has been reported by the Farmer Cooperative Service, USDA.

Date Extended for Soil Bank Contracts

Final date for farmers to enter into Conservation Reserve contracts under the Soil Bank for 1956 has been extended from Oct. 15 to Nov. 30.

The extension was necessary, USDA said, because the press of other Soil Bank business has kept many county Agricultural Stabilization and Conservation committees from doing the necessary work on the Conservation Reserve program.

ICA Authorizations

Pakistan. $50,975—agricultural pesticides (PIO/C No. 91-13-022-6-60299). Contract period: Sept. 21, 1956 to March 31, 1957. Source: World wide. Terminal delivery date: Sept. 30, 1957. Procurement through Pakistan Ministry of Industries, Dept. of Supply & Development.

Republic of Korea. $289,200—agricultural pesticides, dusters, hand operated & scientific & professional instruments, apparatus & supplies for public health relief (PIO/C No. 89-82-250-5-60216). Source: World wide. Terminal delivery date: Dec. 31. Procurement through Federal Supply Service, GSA.

Over 8 Million Acres In Winter Wheat AR

Preliminary and incomplete returns indicate that wheat farmers signed 185,836 agreements placing 8,771,566 acres under the 1957 winter wheat Acreage Reserve program of the Soil Bank through the Oct. 5 deadline, USDA announced.

The figures are based on reports from State Agricultural Stabilization and Conservation offices in the 36 states of the commercial wheat area. Agricultural Dept. officials emphasized that this report is not final.

If farmers who have signed agreements so far comply with the requirements of the program, they will be eligible for a maximum of $150,216,494 in Acreage Reserve payments on the 8,771,566 acres pledged.

July, Aug. Farmers' Cash Receipts Up

Farmers' cash receipts in July and August were up almost 4 per cent from last year, according to preliminary figures released by USDA's Agricultural Marketing Service.

Although operating costs are running higher than a year ago, the report says, it now appears likely that farmers' realized net income in the third quarter of 1956 will be appreciably higher than in the third quarter of 1955. The Agriculture Dept. estimates it might reach a rate of $12 billion or higher, compared with the seasonably adjusted annual rate of $11 billion for the third quarter of 1955.

FTC Reports

Bridgeport Brass Co. has agreed with the Federal Trade Commission that in claiming its mothproofer protects woolens up to a full year, it will disclose that woolens must be re-treated after dry cleaning or laundering, FTC reports.

Are you good at figures?
EXAMPLE 1
Valve Bags for Granular or Pulverized Materials
If you increased filling production from 12 per minute to 15 or more per minute — without paying a penny more for sleeve or special insert bags... what would be the percentage of increase — and dollar savings to you — per ton — per hour?
EXAMPLE 2
Open Mouth Bags for Free Flowing Materials
If you increased filling production from 15 per minute to 20 or more per minute — without paying a penny more for your open mouth multiwall bags... what would be the percentage of increase — and dollar savings to you — per ton — per hour?

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Avenue, New York 20, N. Y.
Daily News Bldg., Chicago 6, Ill.

Gilman PAPER CO.
- St. Marys Kraft Corp.
- Command Tape Div.
- The Celluseal Corp.
- Kraft Bag Corp.

check and mail today

- ☐ We are interested in Example 1.
- ☐ We are interested in Example 2.
- ☐ We are interested in both examples.

NAME OF COMPANY_____

ADDRESS_____

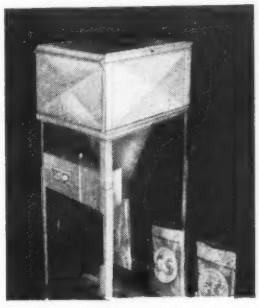
CITY_____ ZONE____ STATE_____ PRINCIPAL_____

PRODUCT MFD._____

We have the bags and the packer to effect such savings—*or more!*

Give us the time to give you the facts!

Dependable as a service for 3 generations. Exclusive Sales Agents for the Kraftpacker Automatic Filling Machine and one of the largest integrated producers of multiwall bags with plants in St. Marys, Georgia and Gilman, Vermont, manufacturing every type of multiwall bag in use today!



PROGRESS REPORT TO INDUSTRY AND AGRICULTURE

what TRONA® *is doing about* Quality Control

FILE ROOM OF TEN-THOUSAND SHIPMENTS. Actual product samples of Trona domestic shipments are held in reserve for three months, export shipments six months, as a special customer service and to provide individual quality maintenance.

Continuous monitoring means more than 400,000 separate quality determinations per month

Typical of AP&CC's company-wide quality control is the modern Quality Control Laboratory at Trona, California. Here, a staff of forty-four skilled technicians make as many as 55,000 separate quality determinations per month, in addition to the 345,000 by continuous monitors controlling process streams and finished products. Trace impurities, too small to measure by conventional analytical methods, are controlled by optical and electrical instrumentation. Tests for trace quantities of Sodium in chemical grade Muriate of Potash are made with ease and rapidity through techniques of flame photometry. Water solutions of Trona products are checked for color and turbidity by means of electrophotometers, resulting in Trona Boric Acid consistently meeting USP and BP quality standards. Constant checking with photovolt reflectometers helps maintain color of reflectance well above minimum guarantees, i.e.: current production of Lithium Carbonate at approximately 95% tri-green reflectance, Soda Ash guaranteed better than 99.5% Na_2CO_3, chemical grade Muriate 99.9% KCl, Anhydrous Borax better than 99% $Na_2B_4O_7$.

Why not give your own products the benefits of the built-in *and controlled* quality of Trona's broad line of basic chemicals for farm and factory?

American Potash & Chemical Corporation

TRONA

LOS ANGELES • NEW YORK • ATLANTA • SAN FRANCISCO • PORTLAND (ORE.)

Producers of: BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES • PERCHLORATES • MANGANESE DIOXIDE • *and a diversified line of specialized agricultural and refrigerant chemicals.*

Plants: TRONA and LOS ANGELES, CALIFORNIA
HENDERSON, NEVADA
SAN ANTONIO, TEXAS (American Lithium Chemicals, Inc.)
Export Div.: 99 PARK AVENUE, NEW YORK 16, NEW YORK

VIEWING WASHINGTON

with Farm Chemicals Washington Bureau

on agriculture

Farmland put into the Acreage Reserve part of the 1957 Soil Bank is now expected to reach 20–25 million acres—based on the amount of land already contributed from winter wheat. Preliminary estimates on the number of winter wheat acres put into the reserve total 10–11 million. With a hoped-for 2–3 million acres to come out of spring wheat land, a total wheat acreage reserve of about 14 million acres is in prospect. Seven to eight million acres are expected from 1957 corn, cotton, peanuts, rice and tobacco.

The Department of Agriculture has pulled all the plugs on the wheat program. It is shifting unused program funds from areas of little demand to areas where demand is greater. It has cancelled maximum individual participation limits—50 acres or half the allotment, whichever is greater—and, in effect, is permitting entire farms to be put into the program. So far, the average maximum payment per farmer is about $800 from the wheat reserve. Payments will be made this winter. A total of $327 million is available for the wheat program.

As in the 1956 program, the 1957 winter wheat acreage reserve is being used by farmers as a crop insurance device. Three-fourths of the sign-up was in five Southwest drought states—Kansas, Colorado, Oklahoma, Texas and New Mexico. Here are some of the state sign-ups in percentages of acreage allotments: Kansas, 35 per cent of the allotment; Colorado, 28 per cent; Texas, 22 per cent; Oklahoma, 21 per cent; Nebraska, 17 per cent; Oregon and Washington, 10 per cent each.

Crop production this year now is indicated as the third largest on record—only a few percentage points off the 1948 and 1955 records. Of 16 major field crops surveyed recently by the USDA, 13 showed increases in prospects from previous months. The corn crop, at 3.4 billion bushels, will be the second largest on record, with yields at a new high of 43.4 bushels per acre. Soybeans are the sensation crop of the season—470 million bushels, 100 million more than the previous record, set last year. Soybean yields are a record 22.4 bushels per acre. Cotton yields now look better than earlier in the season—407 pounds an acre, second only to last year's phenomenal 417 pounds. The cotton crop is estimated at 13.3 million bales, down 10 per cent from 1955.

Higher farm costs will be forecast for 1957 by the Agriculture Department's annual outlook report, out the end of November—unless there's a radical change in the current upward trend in the National economy. Now at record levels—equalling the May 1952 all-time high—the farm cost index continues to inch higher.

Economists say the cost part of the farm cost-price squeeze is the most underrated, and least talked about, of the farm economic structure. They point out, rather obviously, that if costs endlessly creep higher farmers have to get higher prices to offset. But, more significantly, they are bearish on the general level of farm prices for next year.

VIEWING WASHINGTON

on business

Tight money is to be kept tight by the Federal Reserve Board for the next few months, possibly well into 1957, according to inside talk in Washington. There's nothing in sight to indicate that the present booming business climate will change soon—this FRB policy of holding down credit as an anti-inflation measure is expected to continue. Most signs indicate that business expansion is not slowed by tight money. Bank loans to business continue to rise, despite the government-imposed credit damper.

Exceptions to the tight credit policy are expected from time to time to prevent stifling of certain segments of the economy—but they will come through other agencies of the government, with FRB blessing. Small business pinched for credit are the first to benefit. The Small Business Administration has authorized regional directors to approve business loans on their own authority up to $100,000, if a bank puts up at least ¼ of it. Previously, this limit was $50,000.

Farmers may be the next major group to benefit from modification of credit-tightening. Farm Credit Agency officials met recently with the Federal Reserve Board to present the farm case. Farm credit, they pointed out, was tightening in many areas where easier credit was needed to continue farming operations.

Many truck as well as rail freight rates are likely to increase next spring. Eastern and Western railroads have asked the Interstate Commerce Commission to approve a 15 per cent rate increase, and many truck lines are actively considering like increases. Motor freight rate bureaus have begun hearings to consider the proposed increase. ICC procedure on rail and truck rate increases differs. On rails, ICC conducts hearings and then posts permitted increases, whereas on trucks, it steps into the procedure after rate bureaus have published increases. ICC then can suspend them.

The combined production of all synthetic organic chemicals and their raw materials as a group in 1955 amounted to 75,949 million pounds—up 22 per cent above the 61,507 million reported in 1954. Total sales in 1955 amounted to 43,090 million pounds, valued at $5,590 million—compared with 34,707 million pounds, valued at $4,537 million, in 1954. These figures are reported by the Tariff Commission in its annual report—and involve considerable duplication, since they represent totals for chemical raw materials and semi-finished and finished products.

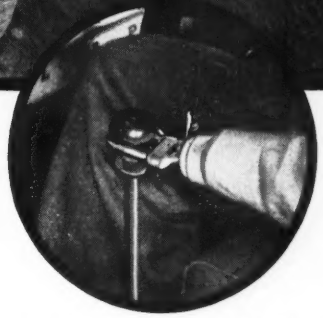
New chemicals sales and production records are in the making for 1956, according to the Business and Defense Services Administration. It looks like a $24-billion-sales year—marking the highest volume in the history of the chemicals industry. Production of chemicals reached a new record high in May 1956, with a Federal Reserve Board Index of 179 (1947–49 as 100) and June-July indexes of 178 each were 3 per cent greater than the January output level and 5 per cent above a year ago. Chemical production for the combined first 6 months of 1956 was 8 per cent greater than that in the first half of 1955.

PAYLOADER®

easiest to operate

One-lever bucket control
tips back • raises • dumps • lowers

The new-model HA "PAYLOADER" with its simple control system, smooth hydraulic brakes and full anti-friction steering mechanism is easy to operate at high output rates the full shift. Ease-of-operation is only one feature of the model HA that enables it to scoop-up, carry and deliver bulk materials faster and at less cost than heavier machines with larger engines. Other outstanding production features are the big bucket payload capacity of 18 cu. ft. (2,000 lbs.), exclusive 40° roll-back bucket action and hydraulic load shock absorber. Fork and sweeper attachments are also available for the model HA to increase its usefulness. Larger tractor-shovels in the complete, proven "PAYLOADER" line (bucket capacities up to 2¼ cu. yd. or 7,500 lbs.) give proportionately greater production. There is a nearby Distributor who would like to demonstrate the model HA or a larger "PAYLOADER" — whatever size best fits your needs.



The one-lever bucket control helped this handicapped man become one of the most-skilled, most productive "PAYLOADER" operators at a Tennessee plant.

THE FRANK G. HOUGH CO.
704 Sunnyside Ave., Libertyville, Ill.

Send data on "PAYLOADER" tractor-shovels
- ☐ HA (18 cu. ft.) and HAH (1 cu. yd.)
- ☐ Rear-wheel-drive types to 1½ cu. yd.
- ☐ Four-wheel-drive types to 2¼ cu. yd.

Name _____

Title _____

Company _____

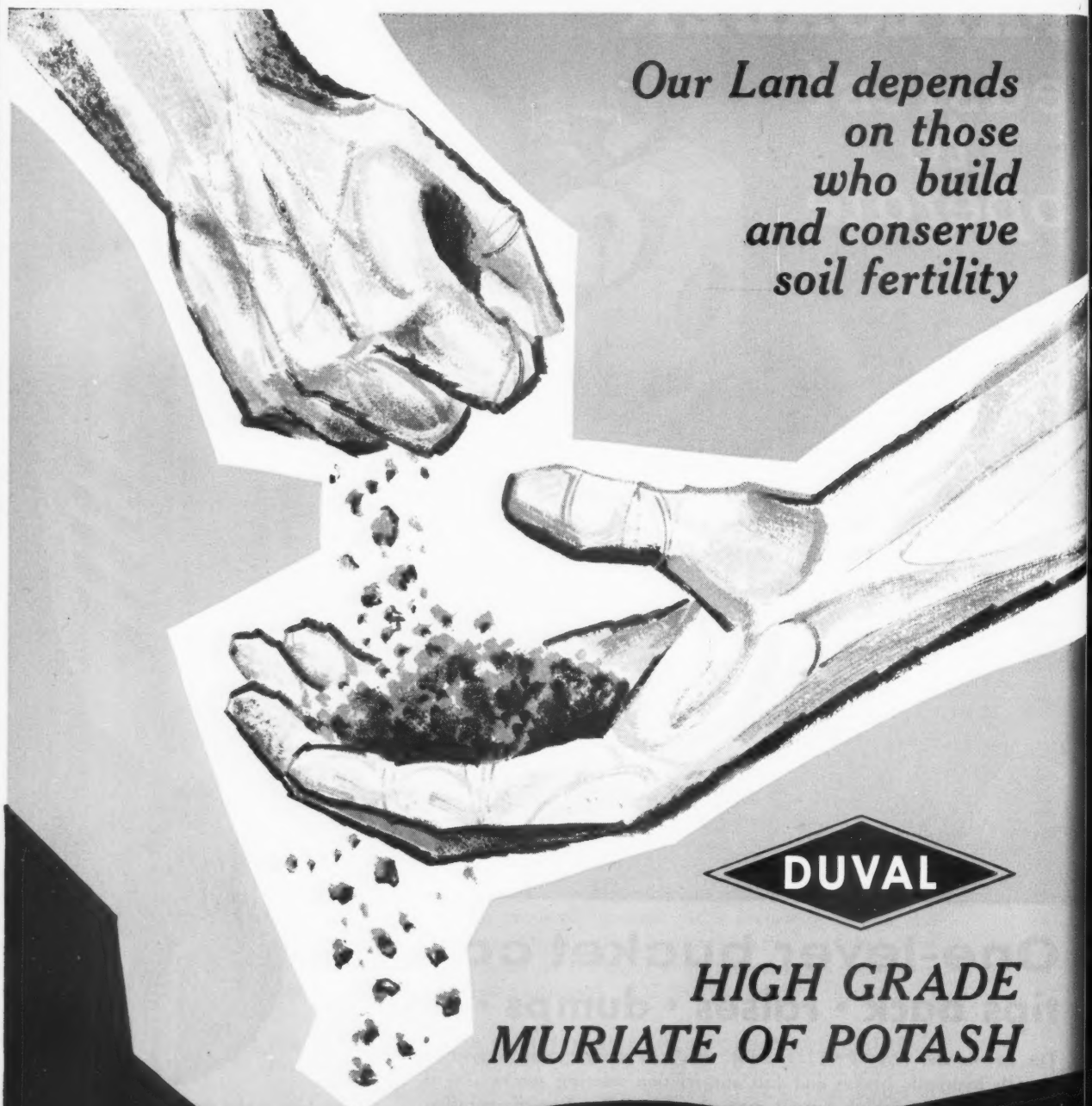
Street _____

City _____

State _____

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



Our Land depends on those who build and conserve soil fertility

DUVAL

HIGH GRADE MURIATE OF POTASH

will help do the job!

High Analysis . Unsurpassed Service

DUVAL SULPHUR and POTASH CO.

Modern Plant and Refinery at Carlsbad, New Mex.

Address all communications to

ASHCRAFT-WILKINSON CO.

Exclusive Distributors

ATLANTA, GEORGIA

Cable Address: Ashcraft

Norfolk, Va. Charleston, S. C. Tampa, Fla. Jackson, Miss. Columbus, Ohio Montgomery, Ala.

Arcadian® News

Volume 1 | For Manufacturers of Mixed Fertilizers | Number 1

SIX NEW NITROGEN SOLUTIONS improve fertilizer quality and cut freight and drying costs

Water squeezed out of new solutions to cut shipping costs as much as 15%

SIMPLIFY PRODUCTION OF MODERN GRANULAR OR SEMI-GRANULAR GOODS

Production of the popular, dustless, non-caking granular-type mixed fertilizers is easier and more economical with new, more concentrated NITRANA® and URANA® Nitrogen Solutions. These six new Nitrogen Division Solutions make a total of 16 Solutions available from Nitrogen Division plants to give fertilizer manufacturers greater flexibility in operation than ever before.

Since the new solutions contain less water, your saving on freight alone can run as high as fifteen per cent. Less water has to be removed from the fertilizer after mixing. Our technical service representatives are always available to assist you in the selection, handling and formulation of the most suitable Nitrogen Solution for your particular fertilizer production—your call will be given prompt attention.

New NITRANA 2M, 3M, 3MC and 7 Solutions, like NITRANA 2, 3, 4 and 6, are composed of ammonium nitrate dissolved in ammonia and water. The characteristics of these solutions are shown in the table at right.

New URANA 11 and 13 Solutions, like URANA 10, 11 and 15, are composed of both urea and ammonium nitrate in ammonia and water. (See table.) Since they provide water-soluble organic nitrogen as well as ammonia and nitrate nitrogen, they are excellent for producing semi-granular and organic nitrogen fertilizer grades.

These solutions provide easier, more economical handling, excellent ammoniation, good particle agglomeration, and quick curing with less caking.

Prompt service on the new solutions is being made available from Nitrogen Division plants at Hopewell, Va., Ironton, Ohio, and Omaha, Neb. In-transit service helps assure speedy arrival of shipments in many additional areas. For full details, consult your Nitrogen Division technical service representative.

Concentrated new solutions assure greater flexibility in producing granular and semi-granular fertilizers.

	New NITRANA Solutions				New URANA Solutions	
PER CENT BY WEIGHT	**2M**	**3M**	**3MC**	**7**	**11**	**13**
Free ammonia	23.8	28.0	29.7	26.0	19.0	33.0
Ammonium nitrate	69.8	60.0	64.5	68.0	58.0	45.1
Urea	—	—	—	—	11.0	13.0
Water	6.4	12.0	5.8	6.0	12.0	8.9
NITROGEN BY WEIGHT						
Free Ammonia N	19.57	23.02	24.43	21.37	15.62	27.15
Ammonia N, combined	12.22	10.50	11.28	11.90	10.15	7.89
Nitrate N	12.22	10.50	11.29	11.90	10.15	7.89
Urea N	—	—	—	—	5.12	6.07
Total N	44.01	44.02	47.0	45.17	41.04	49.0
Specific Gravity at 60°F/60°F	1.147	1.083	1.089	1.125	1.162	1.033
Lbs. per gal. at 60°F	9.56	9.03	9.08	9.38	9.69	8.61
Lbs. N per gal.	4.21	3.98	4.27	4.24	3.98	4.22
Vapor pressure psig at 104°F	18	25	34	24	10	51
Salting out Temperature, °F	26	–36	–30	–6	7	–17

Test Forest Fertilization as a Promising Big New Market

NEED CAREFUL YIELD AND COST DATA TO DETERMINE PROFITS FROM TREE-FEEDING

One airplane, with simple equipment, can fertilize hundreds of acres of forest per day. Trees, like other crops, need plant foods to make vigorous, healthy growth. To build this promising new market for fertilizers, we have to find out how well it pays to feed forest trees.

Recent tests of fertilizing trees have indicated increases in growth ranging from 40 to 65 per cent. Current, larger-scale work is directed toward improving techniques of fertilization. Crop dusting planes have been used where landing space is available. In rugged mountain terrain, helicopters have proved more effective.

New in the United States

Fertilizing of trees to get a greater volume of wood quicker is new in the United States, although it has been done for some time in parts of Europe where wood has been in short supply for centuries. Potash and nitrogen have proved especially important for many forest soils. Fertilizer produces more wood per acre and knocks several years off the time required to grow saleable wood for timber or pulp. Fertilizer also has certain advantages for Christmas tree production.

Most of the reports on plant food for trees pay little attention to the dollar and cent benefits. Recent tests are aimed to determine the practical values of forest fertilization. In one such test, Rutgers University Forestry Department, in cooperation with Nitrogen Division, is checking the value of 400 pounds of 12-12-12 per acre on a red pine plantation at Beemerville, New Jersey.

Provides Many Benefits

Besides providing a new market for the fertilizer industry, forest feeding gives crop dusters the prospect of a new, less hazardous custom application program. Airplane fertilization of forests, inaccessible to ground equipment, can greatly improve ground cover and increase wild life. This should interest hunters and conservationists. Farmers, pulp and paper firms and other woodland owners stand to gain the greatest benefits. For the latest information on forest fertilizer developments, write to Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector St., New York 6, N.Y.

Farm Editor Points Out Fertilizer is Better Buy Than High-Priced Land

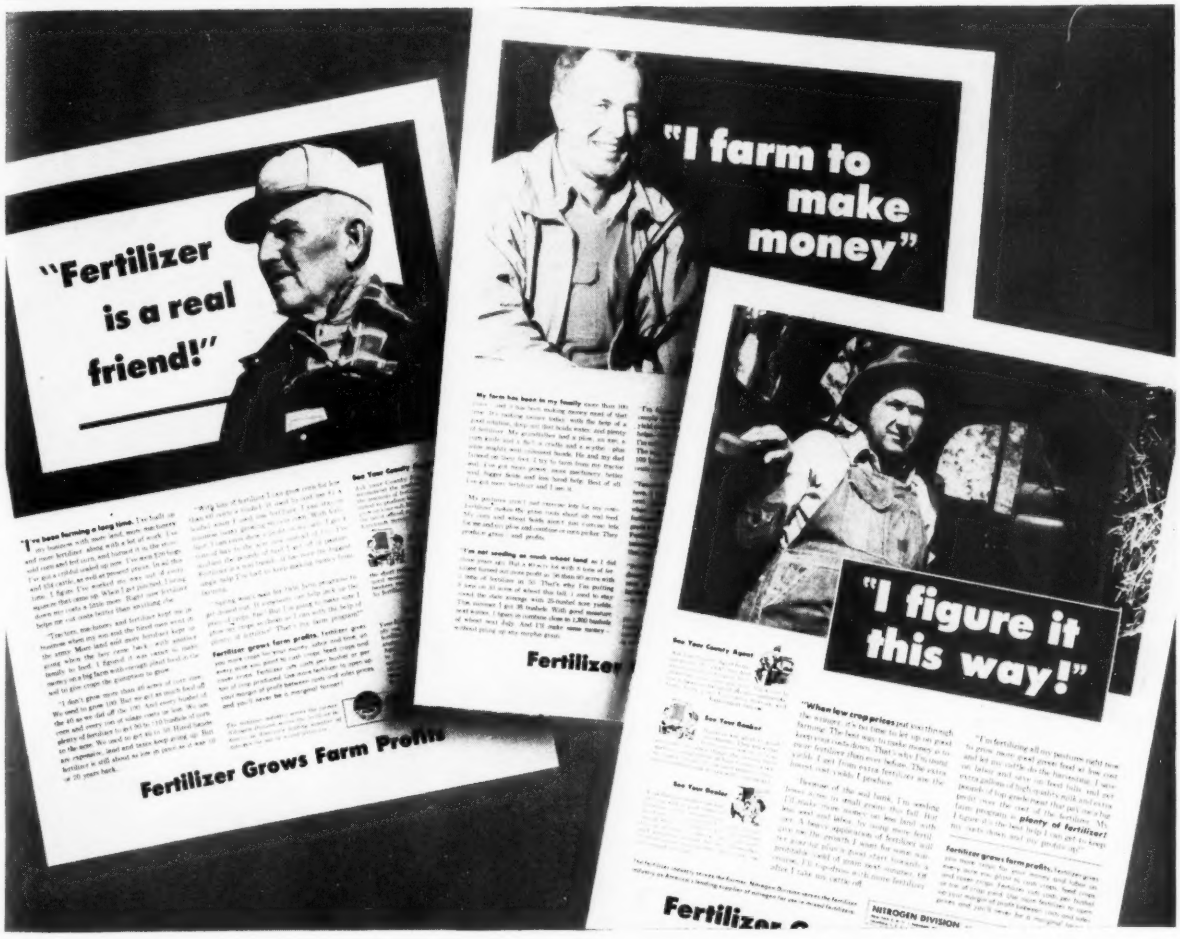
Farmers are in danger of paying too much for land, says Paul C. Johnson, Editor of Prairie Farmer magazine. High-priced land, subject to high taxation, can let farmers down badly, because land is less important in the farm production picture than it has ever been.

Farmers don't pay taxes on fertilizer. And from your customers' own experience, you know fertilizers can often improve crop yields on average land to equal yields on the most expensive land available.

Winter Cell Division Explains Why Grain Needs Fertilizer Now

Down inside the overwintering wheat plants, cell division speeds up as spring approaches. The cells which initiate wheat heads and determine maximum yields are often formed before spring top-dressing of nitrogen can be applied. Winter or fall application of nitrogen, or use of a high-nitrogen 1-1-1 fertilizer, makes sure the grain has enough nitrogen at this critical stage. Even if the soil is too wet or too soft for winter or early spring top-dressing, the crop has all the plant food it needs.

Nitrogen also improves stooling out, makes longer grain heads and bigger kernels, and increases the protein content of the grain. It helps make the leaves bigger and greener to provide the food to make heavier, bigger grain crops. Your customers can profit by using fertilizer on wheat before spring.



NITROGEN DIVISION CONTINUES CAMPAIGN TELLING MILLIONS OF FARMERS FERTILIZER GROWS PROFITS

The powerful, full-page, two-color advertisements shown above are part of a continuing series appearing in leading farm magazines. This campaign, spelling out the profits to be made in farming with more fertilizer, is conducted by Nitrogen Division as a service to the entire fertilizer industry.

Each of these messages describing the benefits of wise use of fertilizer reaches 3½ million readers of farm magazines. Each advertisement tells how fertilizer helps your customers grow bigger yields of crops at lower cost, to assure a bigger return from land, labor, machinery and management. Because the price of fertilizer has not gone up like the prices of most other things farmers must purchase to grow crops, these ads say fertilizer is the farmer's best buy today.

This series, instituted a year ago, is continuing through the winter season and on into the 1957 farm fertilizer buying year. It stresses ordering enough fertilizer, ordering early and accepting early delivery. In every one of these advertisements, farmers are urged to "see your fertilizer dealer." This campaign is designed to help you in your service to farmers. To make it work better, send your comments and suggestions to Nitrogen Division.

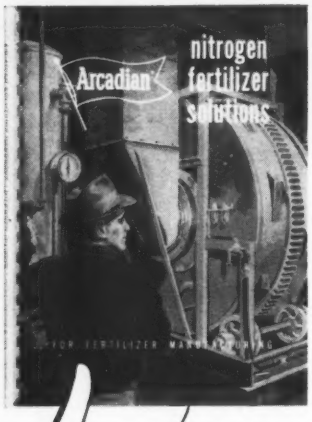
Agronomists Favor Manufacture of Fewer Grades of Mixed Fertilizer

About 15 fertilizer ratios, plus straight materials, are all we need for the entire country, according to Lewis B. Nelson of the U.S.D.A. Agricultural Research Service at Beltsville. By limiting analysis to no less than about 24 plant food units per ton, we might average about 3 grades per ratio, or a total of 45 grades.

Such simplification would be a big benefit to both manufacturers and farmers, and still give them plenty of leeway for good crop feeding.

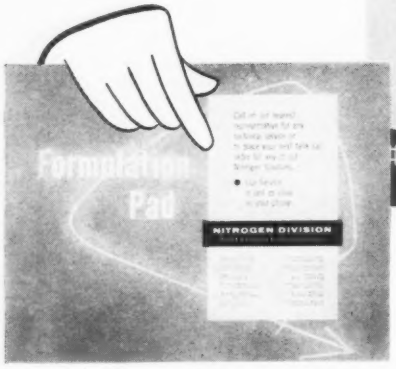
In Minnesota, for example, soil tests show that 90 per cent of the fertilizer recommendations can be made with 8 or 10 ratios. In New York, about 90 per cent of the mixed fertilizer sold is made of 5 ratios now recommended. In Kansas, 5 ratios will cover most farming needs. Even in the complex of California soils and crops, straight materials, plus 5 basic ratios can satisfy most needs.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

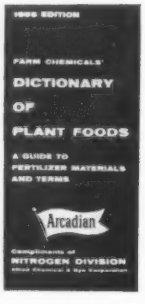


Big, new 48-page technical solutions handbook gives full use data.

How to make fertilizer enriched with N-dure Urea-formaldehyde solution.



Formulation pad speeds figuring in fertilizer production.



Up-to-date guide to fertilizer terminology (issued annually).

Handy memo pads and notebooks imprinted with the ARCADIAN flag.

New, useful slide rule for quick fertilizer calculations.

See Our TECHNICAL SERVICE Representative

for any of these useful aids to fertilizer manufacturers shown at the left. Our technical men, skilled in production *know-how* are always on call for customers.

Arcadian®

Products for Fertilizer Manufacturers

Nitrogen Solutions:

URANA®
NITRANA®
U-A-S*
N-dure*

Other Nitrogen Products:

Anhydrous Ammonia
Urea Products
A-N-L®
Ammonium Nitrate
Sulphate of Ammonia
American Nitrate of Soda

*Trade-mark

NITROGEN DIVISION Allied Chemical

NITROGEN DIVISION
Allied Chemical & Dye Corporation

40 Rector St., New York 6, N.Y.

Hopewell, Va.
Ironton, Ohio
Omaha 7, Neb.
Columbia, Mo.
Kalamazoo, Mich.
St. Paul 4, Minn.
Indianapolis 20, Ind.
Columbia 1, S. C.
Raleigh, N. C.
Atlanta 3, Ga.
Los Angeles 5, Cal.
San Francisco 4, Cal.

Chemicals

348—Chlorates

American Potash and Chemical Corp. has available a new booklet giving complete information on the usage and application of chlorates and perchlorates in the control of weeds and as defoliants. For your free copy just

CIRCLE 348 ON SERVICE CARD

349—Sharples Chemicals

A new catalog of Sharples brand synthetic organic chemicals has just been released by Pennsalt Chemicals. Listed in the 12-page brochure are 77 commercially available products with formulas, product descriptions and suggested uses. In addition the catalog contains detailed information on 22 semi-commercial and 17 experimental compounds.

CIRCLE 349 ON SERVICE CARD

350—Ammonia Bulletin

For detailed information and assistance in the handling and storage of agricultural ammonia, Commercial Solvents Corp. has recently published a 48 page bulletin on the subject. Your free and informative copy may be had if you

CIRCLE 350 ON SERVICE CARD

351—Fungicide and Bactericide

Metalsalts Corp. has recently developed a new fungicide-bactericide combination called Meta-San. The new product is soluble in both water and a wide range of solvents. This advantage suits it for a wide range of oil or water based paints. In liquid form for oil based paints it is known as Meta-San O, and Meta-San W is for water based paints.

CIRCLE 351 ON SERVICE CARD

352—Polyfon

West Virginia Pulp and Paper Co. now has available a bulletin on Polyon, sodium lignosulfonate, used as a dispersant in wettable powder insecticides. Technical information provided covers formulations of DDT, dieldrin, aramite, heptachlor and malathion. Send for a free copy.

CIRCLE 352 ON SERVICE CARD

353—Copper Oxide Booklet

The Calumet Division of Calumet & Hecla, Inc., announces a new booklet, "Calumet Brown Copper Oxide—Fertilizer Grade," for the agricultural market.

The booklet is informative in that it describes Brown Copper Oxide in detail and shows where and how it can be used most economically. It also highlights the intense research and experimental programs continually carried on its behalf. Your free copy can be had if you

CIRCLE 353 ON SERVICE CARD

FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

Process Equipt.

354—Valve Warmer

An easy-to-clamp-on valve warmer is available from Dean Products Inc. Designed to handle pipe in sizes from 4–10 inches the heater is made of two metal sheets welded together to create flow channels. For further information on this handy device just

CIRCLE 354 ON SERVICE CARD

How to use the READER SERVICE CARD

- **Circle number of literature you want.**
- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

355—Hose Links

A new system of flexible hose links combined with quick-connect "snap on" hose couplings is currently available from Titeflex, Inc. In using these snap on flexible hose links in place of multiple-valve installations, conventional fixed pipe lines are run to a central point, where flexible links can be rapidly shifted from one piping line to another. The couplings are leakproof at low and high pressures. For more information just

CIRCLE 355 ON SERVICE CARD

356—Hardinge Mills

A new bulletin from Hardinge Co. illustrates and describes the company's line of mills—conical, disc-roll, batch, tube, cylindrical, rod and tricone—and also includes information on grinding mill accessories. For a copy

CIRCLE 356 ON SERVICE CARD

357—Centrifugal Reel

A unique, severe bolting action enables the Sprout-Waldron all steel Centrifugal Reel to give satisfactory screening performance even on difficult-to-handle materials, the company reports. Details of construction and operation are given in a new bulletin.

CIRCLE 357 ON SERVICE CARD

358—Circle Seal Valves

Circle Seal Products Co. has published a new brochure describing its line of valves. For your copy of this booklet, which has both illustrations and technical information

CIRCLE 358 ON SERVICE CARD

359—Cash Catalog

Two new items of the Cash Standard line of pressure and temperature control products are covered in a new four page illustrated brochure, the type 57 pneumatic recording controller and the type 58 recorder. Full technical specifications are given. For a copy

CIRCLE 359 ON SERVICE CARD

360—Granular Fert. Equipt.

Edw. Renneburg & Sons Co. has a new 12-page bulletin describing its continuous granular fertilizer processing equipment. Included is information on ammoniators, granulators, continuous combination ammoniator-granulators, dryer furnaces, dryers, coolers, combination dryers and coolers, air handling systems and pilot plant equipment. There is also a layout of a fertilizer plant using Renneburg equipment and a granular fertilizer unit flow sheet.

CIRCLE 360 ON SERVICE CARD

361—Pneumatic Controllers

A 56-page illustrated bulletin on the new Series 500W Pneumatic Controller is available from Bristol Co. It describes the high sensitivity, wide control-band controllers for temperature, pressure, flow, vacuum, etc. Features include control band width ½ per cent to 400 per cent, high sensitivity without loss of stability, precision linkage and reset action stops. For a copy,

CIRCLE 361 ON SERVICE CARD

Materials Handling

362—Transfer Hose

Aeroquip Corp. has announced the availability of a new bulletin covering its line of transfer hoses for use with anhydrous ammonia. An important feature is the remarkable new one-piece fitting which may be inserted into the hose by hand, without special assembly tools, yet will not leak or blow off. Send today for your free copy.

CIRCLE 362 ON SERVICE CARD

363—LP Conversion Assembly

Beam Products Mfg. Co. has available information on its LP gas conversion assembly, designed to do the job on any fork lift truck. Information provided includes data on components and mounting instructions. For information giving step by step assistance in the conversion of industrial trucks to LPG just

CIRCLE 363 ON SERVICE CARD

Packaging

364—Bag Closer

Details of a portable bag closer are given in a new booklet provided by the Dave Fischbein Co. Described as being able to close average 100 lb. bags in less than 6 seconds it handles bags made of paper, cotton, burlap and jute. In addition it can be operated with a minimum of maintenance. For further details of the machine

CIRCLE 364 ON SERVICE CARD

365—Save Labor Costs

"How to Save Labor Costs with Corrugated Boxes," a 28-page booklet from Hinde & Dauch, explains how to figure your own packaging labor costs, and how to reduce them, says H&D. It discusses box design, box assembly, packing, sealing, handling and warehousing, and their effect on total labor costs. For a copy,

CIRCLE 365 ON SERVICE CARD

How to use the

READER SERVICE CARD

- **Circle number of literature you want**
- **Print or type your name, position, company and address,**
- **Clip and mail the Service Card.**

366—Paper Selector

A paper selector for multiwall paper bags, in slide rule form, is available from St. Regis Paper. By utilizing the slide rule format, it is possible to select any multiwall bag paper and quickly find its properties, a description of its construction and present packaging applications.

CIRCLE 366 ON SERVICE CARD

367—Vending Displays

"How to Select Vending Displays That Increase Sales" is the title given to the new edition of a booklet that shows manufacturers how to make the most of their merchandising at the point of sale. The 36 page book shows how the vending display stand can be effectively tied in with overall merchandising efforts, how it can be designed to win dealer acceptance, and how it can be tailored to fit the budget. For your free copy of this helpful book just

CIRCLE 367 ON SERVICE CARD

Miscellaneous

368—Protective Coatings

Carbomastics, epoxytar coatings, with solids content ranging from 85 per cent to 90 per cent, are covered in a new booklet from Carboline Co. There are five members to the series, and combinations of various members are recommended by the firm for maintenance, equipment exteriors, tank linings and floors. For a bulletin giving chemical and physical properties, recommended uses and typical systems,

CIRCLE 368 ON SERVICE CARD

369—Decreasing Costs

How industry and business can decrease operating costs and achieve greater profits is explained in a new eight-page illustrated booklet from Remington Rand. Entitled "These White Elephants are Made of Paper," the booklet outlines methods of improving management and records control. For a copy

CIRCLE 369 ON SERVICE CARD

370—Space Heater

Full details on a portable space heater are available from Clayton Mfg. Co. Information describes how the heater operates and provides details as to its construction and maintenance. It is designed to deliver 120,000 Btu's per hour; operate 12 hours on one filling of fuel oil or kerosene. Run by electricity, it can be plugged into any 115 volt A-C outlet. Additional information can be obtained if you

CIRCLE 370 ON SERVICE CARD

371—Pocket pH Meter

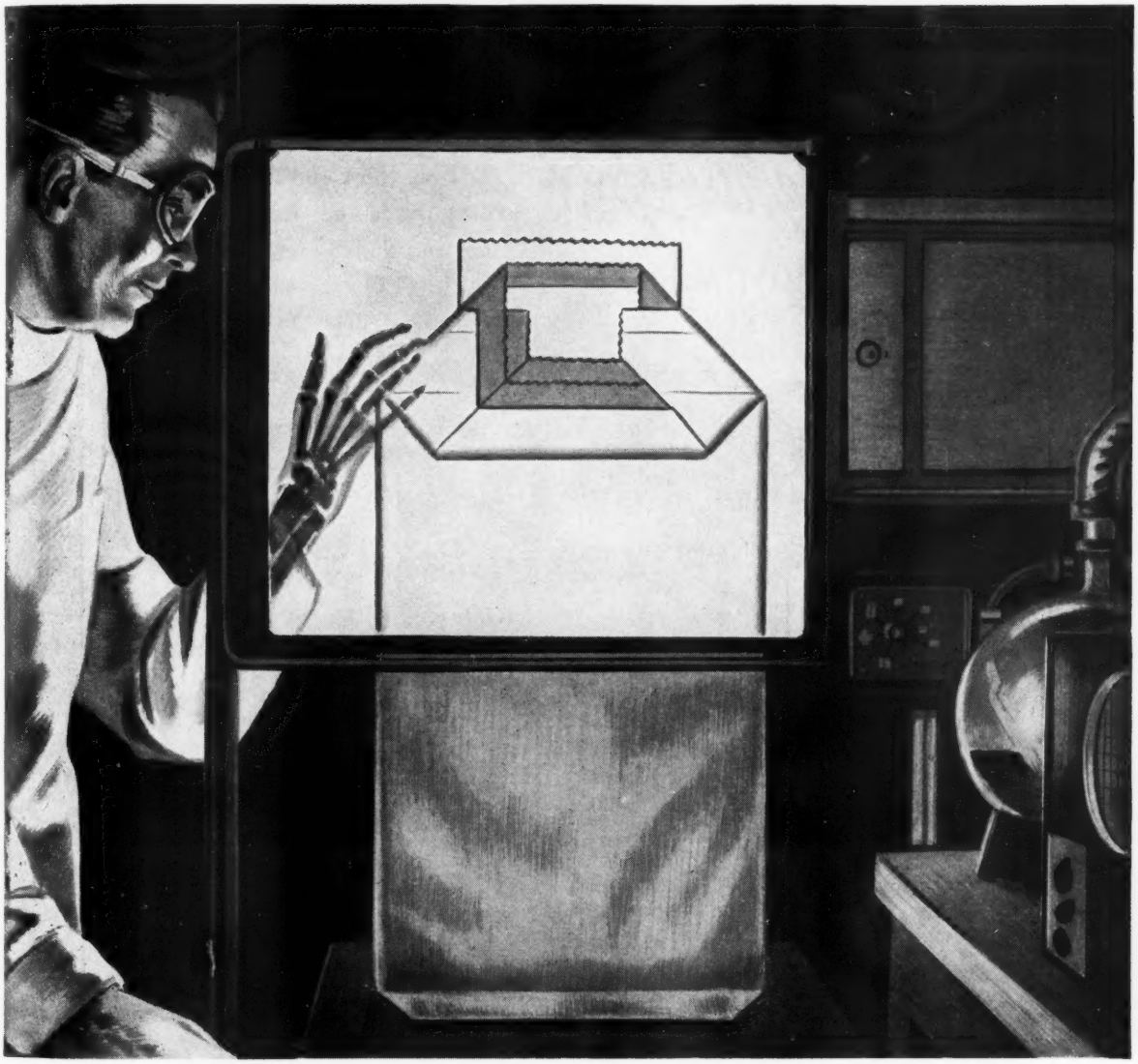
Scientific Instruments Div. of Beckman Instruments is producing a pocket-size *p*H meter for acidity and alkalinity measurements which it says is accurate, dependable, easy-to-operate and uses a combination electrode. Battery-operated, its range is from 2 to 12 *p*H. For more information,

CIRCLE 371 ON SERVICE CARD

See pages 58, 59, 62 for information on these Reader Service numbers—

372—Diesel Engines
373—Dryer-Blender
374—Steam Trap
375—High Temp. Valves
376—P-E-P System
377—Plastic Steel
378—Unloading System
379—Y & T Lift Truck
380—Jacketing for Tanks
381—Isobutyronitrile

Things you can't see count too!



HUDSON
Ply-weld

The New, STRONGER Stepped End Multiwall

The Inside Story of this new bag is one of benefits to you. Its overlapping, pressure-welded plies give you these definite advantages:

STRONGER at valve and bottom ends. Plies overlap and weld together for extra strength at stress points.

REDUCES BREAKAGE in filling and transit. Greater strength saves time, temper, money.

SPEEDS PRODUCTION. Goes on the spout faster, more easily.

HANDSOMER, more attractive when filled because of smoother, more flexible sides. Gives greater product appeal.

If it's protection and speed in handling you want, write for full details on this new, stronger pack. Address Dept. 211

HUDSON PULP & PAPER CORP.
477 Madison Avenue • New York 22, N. Y.
Plants at PINE BLUFF, ARK. • PALATKA, FLA. • WELLSBURG, W. VA.

Presenting

THE MOST MODERN BAG PRINTER

Manufactured in
One, Two, Three and Four Colors for printing made up bags of Paper, Cotton and Burlap, new or used.

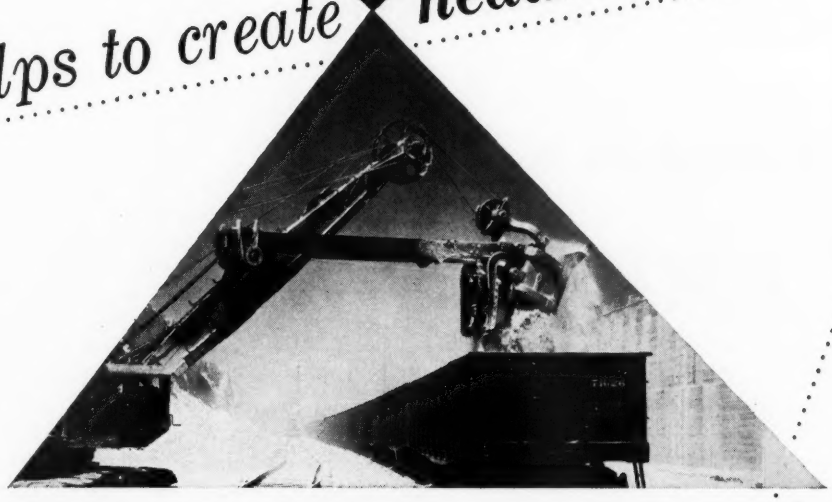
Let us send you complete information with descriptive literature.

SCHMUTZ MFG. CO.
18th and Main Streets
Zone 3
Louisville, Ky.

Cable Address "SCHMUTZ"—Long Distance Phone CLAY 7771

SULPHUR

helps to create headline products



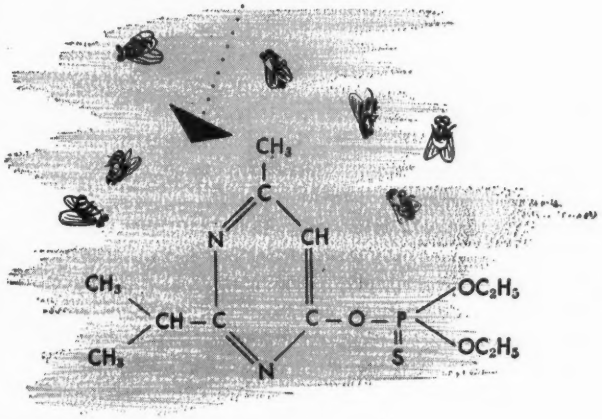
DIAZINON*

What a 'killer' this complex chemical is turning out to be! And quite impartial as to its victims: — houseflies, barnflies, fruitflies, aphids, mites, ants, beetles, chinch bugs, roaches, and many other pests that bother man and beast. It kills them dead!

As with the former chemicals which made such notable headway in man's fight to subdue these destructive pests, Sulphur is very much in the picture—here is one of the many variations of the benzene ring . . . the Diazinon Formula. That letter "S" tied in with the letter "P" discloses the all-important thiophosphate.

Sulphur, often called one of the Four Pillars of the Processing Industry, is benefiting mankind in many ways. None is more important than that of controlling crop-destroying pests.

**A product of the Geigy Chemical Corporation.*



Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N.Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units
- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

The above home is being completely covered in preparation for fumigation.

Recent Developments In PEST CONTROL

By Philip J. Spear, Ph. D.

National Pest Control Assn., Inc.

BY PEST control, or more strictly structural pest control, we mean the control of insects, rodents and allied pests that infest dwellings, business and industrial establishments (such as stores, warehouses, factories, theatres and hotels) vehicles and ships. It is an industry concerned not only with the pests which damage structures, but also with those which destroy commodities being stored or transported, or which may injure or annoy the occupants of buildings. Preventive control, which is becoming increasingly important, often requires the destruction of pests before they can reach the structure.

Data are not available for determining the number of employees or the dollar volume or even the number of firms engaged in structural pest control in this country. Estimates based on long experience with the industry and on partial records indicate that there are over 10,000 individuals engaged in the industry and that the estimated dollar gross business in contract structural pest control in the U. S. is approximately $100,000,000 annually. It is further estimated that about 40 per cent of this business is in general pest control, that about 35 per cent is in control of termites and other wood destroying organisms, while rodent control and fumigation account for most of the remaining 25 per cent. It is similarly estimated that the industry purchases from five to eight million dollars worth of chemicals annually.

Developments within this industry in the U. S. during the past few years can be attributed in a general way to changes in the insects, changes in the standards and living habits of the human population, and a change in the competence of the personnel who are active in the structural pest control industry. The purpose of this article is to call attention to some of these changes and their effects.

Resistance to Insecticides

Resistance to insecticides on the part of several important household pests is the most important single development within the industry in recent years. Resistance in the German cockroach, *Blattella germanica* (L.) which was first brought to light by a pest control operator of Corpus Christi, Tex., was proven in the laboratory by an investigation carried on jointly by representatives of a chemical supplier, the Federal government and the industry's national association. Until the present, at least, we have no convincing evidence that there is resistance in any other species of roach in the U. S. Resistance in German roaches is common through the southeastern third of our country and appears occasionally in New York, Chicago and other northern cities. Chlorinated hydrocarbons are virtually useless against the resistant forms. In most cases resistant roaches are being effectively controlled by such organic phosphates as diazinon and malathion alone or in combination with some of the chlorinated hydrocarbons, but frequent treatments are usually required. Older materials such as pyrethrum, borax and sodium fluoride are also used. At scattered locations, pyrethrins in contact sprays have failed to give practical control.

Since the organic phosphates are somewhat less effective against non-resistant roaches than are some of the chlorinated hydrocarbons, operators faced with the problem of controlling resistant German roaches and any of the other species of roaches on one premise may combine the organic phosphate with a chlorinated hydrocarbon.

Cat and dog fleas, resistant to chlorinated hydrocarbons, occur in the area adjoining the Gulf of Mexico and extending up the Mississippi and Ohio River valleys. Resistance also occurs to a lesser extent in brown dog ticks and bed bugs.

Miscellaneous Pests

One of the most difficult problems currently faced by pest control operators is the control of the clover mite, *Bryobia praetiosa* Koch, in structures. The life history of this mite as a household pest is not well known, nor are the causes for its occasional great abundance in scattered areas throughout most of the country. The principal difficulty in the control of clover mites lies in the fact that their presence may not be discovered until they are found by hundreds of thousands in the interior of the home or place of business.

A number of pest insects and allies have attracted

attention during recent years because they have increased in number or spread to new habitats. The wharf borer, *Nacerda melanura* (L.), is increasingly common in the northeastern quarter of the country. It is a pest, not so much by causing structural damage, but more often as a nuisance pest after developing in great numbers in buried timbers or in substandard structures. In the eastern part of the country, the old house borer, *Hylotrupes bajulus* (L.), appears to be increasing as a pest of structures.

The present rate of home building in the United States exceeds 1,000,000 structures annually. Such expansion not only taxes the timber supply, resulting in occasional use of lumber of marginal quality due to poor inspection or storage, but whole communities now occupy land which only a few months ago was in crops or forest; consequently, some structures are built of lumber which contains bark beetles and other wood destroying insects, or the new house may be constructed on ground where ants, ground beetles, mites, millipedes and a host of other occasional pests occur. Wooded land is usually infested with termites.

In termite control a number of new developments have occurred. It was mentioned earlier that some of the changes in pest control have been brought about by changes in the way of life of humans. This is evident in termite control, for there has been a noticeable shift in the post-war years to the construction of low houses, constructed upon a concrete slab. It was assumed by many that such construction was immune to attack by subterranean termites. Within the last few years, however, the general public and particularly agencies concerned with financing such structures, have recognized the fact that a house built upon a slab is very susceptible to termite attack and that when attacked, the expense of repairs is oftentimes much higher than for conventional structures. Despite the emphasis above on slab-type structures, houses having full basements or only crawl space between the floor and the soil beneath are also subject to subterranean termite attack.

Construction features which have been used to protect against attack by subterranean termites include foundation walls of poured concrete or of unit masonry capped with reinforced concrete, some limited use of pressure-treated timbers in the substructure and metal termite shields. Some foundation walls can be surmounted by shelter tubes but they do separate wood from soil and force termites to expose their activities. Pressure treated wood is expensive and its use is therefore limited. Experience has shown that most termite shields fail to provide the desired protection due to poor workmanship, faulty design or wear and tear after installation. Furthermore, in slab houses there is no practical way in which shields can be effectively applied.

In 1954 and '55, many conferences were held by industry and governmental groups concerned with structural pest control for the purpose of selecting effective protection for frame structures by chemically treating the soil in which they were to be built. As a result of these conferences, a list of chemicals and rates of application were prepared that were acceptable to both industry and U. S. Forest Service representatives. Subsequently, at the request of the Federal Housing Administration, the Building Research Advisory Board of the National Academy of Sciences—National Research Council appointed a special Advisory Committee to undertake a study of protection against decay and termites in wood frame construction. The report of this board, composed of distinguished biological scientists and authorities in the field of building, will serve as a guide to all who are concerned with protection of frame structures and especially to termite control operators.

The Advisory Committee found that:

"1. Sound construction practices are of primary importance in decay and termite control.
2. Local experience should govern in determining the relative severity of decay or termite hazards.
3. The application of control measures should be in direct relation to potential damage."

and that the incidence of termite damage is tending to increase in the United States because of:

"a. The increase in the number of houses standing.
b. The use of styles of houses susceptible to termite attack.
c. The northward advance of subterranean species of termites.
d. The advance of residential construction into previously undeveloped areas."

The Committee divided the country into zones of subterranean termite incidence and damage. The Gulf states and southern California lie in the zone of very heavy activity, while the region of heavy to moderate activity includes the remainder of the country south of a line running approximately through Boston, Chicago, Denver and the northern edge of California.

Legislation

During the past three years, five states have adopted laws regulating the structural pest control industry, making a total of twelve states which now have legislation affecting the industry. The laws and their regulations are concerned for the most part with termite work, and in eight states a minimum standard is specified. In some cases these minimum standards are established by the industry through its state associations, or by industry representatives and regulatory officials working jointly, but in other cases, the standards were drawn up by the regulatory body without industry participation. Inspections cover only a small portion of the termite work and almost none of the general pest control work.

Nevertheless, it appears that at least twenty-eight full-time men and forty-three part-time men are employed in the administration and enforcement of state laws regulating pest control operations, and the cost of this program is well over $100,000. Combined efforts of entomologists and industry associations in educating the pest control operators in safe practices undoubtedly has gone farther than legislation in protecting the public health and pocketbook, for the practices of the pest control industry appear to be quite uniform throughout the country, regardless of legislation.

Equipment

There have been several developments in the field of equipment. For fumigation, instruments are available for remote and continuous sampling of concentrations of fumigants. Such equipment leads to increasing use of and refinement of techniques for the use of tarpaulins in the control of Khapra beetle and wood destroying insects. Specialized equipment of high quality and excellent workmanship is now available to the industry, resulting in greatly improved efficiency of operation. Equipment has been developed for dispersing insecticides in liquid form into soils below the surface or beneath concrete slabs.

Tolerances

One result of the general public's increasing desire for freedom from pests and pesticides has been the establishment of tolerances for pesticide materials in or on raw agricultural commodities. (See Tolerance Guide, September FC, pages 45–54.) Pest control operators, for the most part, have not been seriously affected by the establishment of these tolerances. The one exception lies in fumigation. At the present time, pest control operators are ill-advised to contract for methyl bromide fumigation of raw agricultural commodities, unless chemical analysis of the commodities or a reliable history provides reasonable assurance that the additional fumigation will not cause an excessive residue of inorganic bromides.

The establishment of pesticide tolerances in raw agricultural commodities has other serious implications for pest control operators. It has focused attention on the residue problem. Studies prior to and subsequent to the establishment of tolerances have pointed to the extreme difficulty in protecting foodstuffs from many pests by means of the pesticides without introducing detectable quantities of insecticides. The smallness of these deposits which can be detected is a tribute to analytical techniques, but regardless of how small, legally they are adulterants.

As a result of the emphasis on residues, there is a tendency for interest in new insecticides to fall either on those having long residual life but low mammalian toxicity and insecticidal action, or on those which have very short residual life but high toxicity to insects and higher animals. Neither of these categories fits the pest control operator's usual needs. DDT and chlordane, for example, have served him well for they are rapidly toxic to pests, remain effective for several weeks after application, and in a majority of cases can be used with a reasonable degree of safety in most locations where they are needed. Now that the chlorinated hydrocarbons have failed against two or three of our important pests and there are signs of weakness in organic phosphates and pyrethrins as well, we are concerned about the development of new materials specifically for the pest control industry.

Pest control operators can and have assisted in the accumulation of data regarding pesticides. Members of the National Pest Control Association have field tested both rodenticides and insecticides before their registration by the Pesticide Regulation Section of the U. S. Department of Agriculture. Recently, special formulations of malathion and diazinon have had their first registration for certain application, such as control of resistant cockroaches, limited to use by pest control operators only. Although such registration is not required for pest control operators using insecticides only in interstate service work, it does provide them with a measure of authoritative support for the effectiveness and safety of such treatments, and at the same time extensive field experience is obtained in the use of these chemicals without the risk of placing them in the hands of the general public.

The numerous technical problems with which the industry is faced has created a demand for entomologists to enter the pest control business. We are aware of at least 130 graduate entomologists who are now employed in commercial pest control work. Several score more are employed by various levels of government in activities which are virtually identical with those of entomologists in private industry. With this relatively large number of entomologists being active in the industry, and with others being sought after daily, the technical standing of their firms must benefit. Servicemen must learn much by experience, but training by entomologists has already demonstrated its value in safer and more effective use of pesticides. Not only can these entomologists train servicemen and solve problems within their own organizations, but by combined effort they can apply their scientific training to develop and accumulate much useful information about both pests and pesticides. Future developments in the pest control industry can be expected, therefore, to be influenced less by changes forced upon us by the pests, but more by the technical advances achieved by entomologists and other technically trained workers in the pest control industry. ▲

From a talk presented at the Tenth International Congress of Entomology, Montreal, Canada.

Pending Federal

Legislation Affecting The Industry

Farm Chemicals Washington Reporter Advises What to Look For In The Way of Gov't Laws When Congress Convenes

By John Harms

EARLY signs indicate that a great deal of proposed legislation directly and indirectly affecting the farm chemicals industry will be introduced when the new Congress convenes in January.

Even though the make-up of the next national legislature will differ some from the past Congress, generally the issues of the past session will be taken up again. Proposed bills not passed last time will have to be re-introduced. It likely will be at least March before major bills begin rolling out of the committees.

The shape of things to come from the new Congress will, of course, depend a great deal upon which party controls the Congress, which party holds the White House—and if we have a split government, Congress controlled by a party not in control of the White House.

Generally speaking, there will be little difference in climate for strictly chemical-industry legislation with either party. Rather than which party is in control, the significant thing will be the key men in the committees. On broader policy questions, however, such as anti-monopoly and tax legislation for industry—Republican leadership has tended to be more friendly during the past four years.

On over-all policy affecting your business, here's how the parties fit in. Basically, Democrats tend more toward policies that encourage inflation, while Republicans incline to hold back a continued inflation with less worry over a little deflation. On fiscal policies, Democrats lean toward abundant money, easy-term borrowing and low interest rates. Republicans lean toward enough but not over-abundant money supply, tougher borrowing, higher return on money.

In the remaining weeks before the January opening of Congress, congressional committee staffs will be busy drawing up legislative proposals, new bills, for introduction early in the year. While lawmakers were out thrashing the bushes for votes, their aids were putting finishing touches on pet bills. Many of the bills introduced last year which failed to make the grade will be dressed up and tossed in the hopper again.

Here is a run-down on major proposals you can expect to see come up in Congress in the coming session—others will be developed as (and if) the economic picture of the nation changes and as industries impress their needs upon the lawmakers.

Food additives. New efforts will be made to push through bills requiring that new chemicals designed for use on or in foods be pre-tested for safety to consumers before they are permitted to be used. Bills sponsored by Rep. J. Percey Priest and Rep. Joseph O'Hara to get this done didn't get far in the last session, but are rated better than even chances next time.

Transportation. A big drive is developing this fall to whip up strong support to repeal excise taxes on transportation. Joined in this campaign, which may develop into one of the top issues in the next Congress, are such diverse groups as farm organizations, truckers, railroads, and a host of other transportation users.

A Conference on Repeal of Excise Taxes on Transportation has been created, chaired by Don Ward of Olin-Mathieson. Ward will present an over-all statement on reasons for repeal at November hearings of the Forand subcommittee of the House Ways and Means Committee. Testimony then will be given on specific points by others. The hearings will run for two weeks—in conjunction with hearings designed to study the entire excise tax structure.

Transportation excises, as the other excises, were clamped on during World War II and Korea. Repeal advocates say the danger is that once such taxes are on the books, they have a habit of becoming permanent. They figure 1957 is the crucial year—when they must be wiped out.

Taxes. Along with repeal of excise taxes to be sought this winter—business interests are blueprint-

ing plans to push again for revision of the corporation tax structure. The present corporation income tax of 52 per cent is scheduled to go down to 47 per cent on April 1. But, as in the past session, Congress is not expected to let the rate drop that much. Some other change, however, will be attempted.

No compromise was apparent at press time in the industry-Food & Drug Administration rift over the powers of the courts to settle the safety question of additives. Bills presenting both sides of the question will be introduced—with the FDA viewpoint being that the courts are not qualified to settle the safety problem. This difference of opinion, held strongly by both parties, was the primary block to passage of the legislation last year.

Pesticides and wildlife. Odds favor passage in 1957 of a bill directing the Interior Department to study the effects of insecticides, herbicides and fungicides on fish and wildlife. Farm organizations will join with sportsmen, conservationists and foresters in demanding that a full-scale study of the problem be made. Several of the bills last session called for an appropriation of $280,000 to conduct the study.

If approved, and legislative insiders rate it a good chance, the study eventually is expected to lead to legislative restrictions on the use of pesticides where they might injure wildlife and fish. Meanwhile, sponsors of the legislation report that the number of law suits against chemical plants which allegedly contaminate surrounding areas are on the increase—as well as complaints that pesticide applications poison birds, bees, rabbits and other wildlife.

Antibiotics. Watch for efforts—either through legislation or by administrative directive—permitting a certain amount of specific antibiotics to remain in or on food as consumed. Increasing amount of research indicates that some antibiotics, primarily the tetracycline group, have no harmful effect on people when consumed in minute quantities on or in food.

The Food & Drug Administration for the past year has permitted one antibiotic of this group—chlortetracycline—to be used in preserving the shelf-life of poultry meat. But the prime consideration was that this antibiotic cooked away so that no significant residue remains for consumption. Next step, sought in some quarters: Permit some residue.

Soil Bank. Efforts will be made to completely overhaul and change the direction of the $1.2 billion Soil Bank program authorized by Congress in the past session. At least one major farm group, the National Grange, and one big commodity group, the National Wheat Growers Association, want to put incentive payments on conservation of land—not on reduction of production as such. Thinking is that if you put incentives to farmers for conservation high enough, they'll do more of it and production of crops will be correspondingly reduced. Such a change might put more of a premium on fertilizer-for-conservation than is in effect under the present set-up.

Tennessee Valley Authority. The industry fight to chop down the size of TVA operations will be renewed with vigor this winter. Spearheading the drive will likely be the U.S. Chamber of Commerce which made several important recommendations to Congress last session. The Chamber urged Congress to order TVA to halt all chemical research, turn fertilizer research facilities over to the Agriculture Department and sell its fertilizer production facilities to private enterprise. If the full treatment is not forthcoming, the Chamber suggests that TVA sell chemical fertilizers at prices which would include all costs, including taxes—make TVA plant foods competitive with private industry.

Antitrust. The fight to put across tighter antitrust controls will be taken up again this winter. Lawmakers who have proposed such measures in the past have shown growing enthusiasm for their chosen work. But some of the proposals had support from some segments of industry.

Here are some of the regulatory proposals which failed passage last time, but for which the outlook is improving: Require advance notice to federal antitrust agencies of proposed corporate mergers, permit the Federal Trade Commission to obtain injunctions against proposed mergers, limit the "good faith meeting of competition" defense to a price discrimination charge, and subject bank mergers to the Clayton act.

Another battle to ease up on personal income taxes can be expected, but with incomes rising to new highs and inflation a danger, the Administration likely will drag its feet in coming across with an endorsement. Low-income people, however, may get some relief.

Inflation. Emergency standby controls may be requested, although Congress may not go along. Thinking in legislative circles is that the Executive Branch has all the powers now that it needs.

Mining, phosphates. A bill to permit individuals lease up to 10,240 acres of public lands in one state for the purpose of phosphate rock mining will be started through Congress again. Odds now favor the bill, which passed the Senate in the last session, but died on the vine in the House.

New uses for farm products. The Commission on New Uses for Farm Products will make its first preliminary report to Congress February 15. Chief interest of the Commission centers on grains for industrial alcohol. Final report of the Commission is due in June. After that, Congress will attempt to draw up legislation implementing the report. The idea is to find new industrial outlets for farm surpluses. Executive director of the Commission is Wheeler McMillan, FARM JOURNAL, Philadelphia. ▲

AAFCO Meets

Discusses and Adopts Resolution on Changing To Elemental Basis

ABOUT 200 fertilizer control officials, USDA officials and members of the fertilizer industry attended the tenth annual meeting of the Association of American Fertilizer Control Officials at the Shoreham Hotel, Washington, D. C., October 19.

The Presidential Address by Dr. M. P. Etheredge, state chemist of Mississippi, "Industries—Large and Small—Make America," was well received and had many thought-stimulating ideas.

"Reducing the Oxides," was the timely subject of Dr. W. F. Price, Swift & Co., Plant Food Div. He said that this subject, even though controversial, was his and that the ideas conveyed in his talk were also his own. "Everything must have a beginning; someone must motivate and cultivate an idea to start it on its road to life. I wouldn't know just who should be handed first credit on the elemental idea," said Dr. Price.

This proposal has been kicked around in this country for at least 30 years, and the change actually has been made in Norway, whose fertilizer practices are entirely different from ours, he continued. "The question that has to be answered today is not whether this historical change can be made—certainly it can, but is there sufficient unanimity among all the groups affected so that the change can be made without causing a chaotic condition?"

Dr. Price reported that back in 1951 at a meeting of the agronomy heads from colleges in the North Central states, a resolution was drafted recommending discontinuance of the practice of expressing phosphorus and potassium contents of fertilizers in terms of the oxide. He pointed out three advantages presented to the Soil Science Society of America and American Society of Agronomy by their fertilizer committee: (1) uniformity of terminology; (2) simplicity of expression; (3) accuracy. In 1955, the American Society of Agronomy voted by a margin of 18 to 1 to endorse the change-over, and since then endorsement has been received by the Soil and Fertilizer Research Committees, Experiment Station Policy Committee and the Southern Fertilizer Control Officials.

Dr. Price stated that the principal theme of his discussion was, "Be sure before making the move that there is enough support in each state to get the necessary laws changed. My appeal and primary reason for discussing this subject with you is to avoid what might occur when some states make the change and others do not."

Dr. Russell Coleman, executive vice president of the National Plant Food Institute, spoke briefly and presented the newest film produced by NPFI titled "It Is In The Bag."

"Functions of the Land Grant Colleges" were explained by Dr. R. F. Poole, president, Clemson A&M College. A past president of the Land Grant College Association, Dr. Poole spoke with added authority and pointed out very vividly ways in which control officials, industry members and others could work more closely with land grant colleges.

Hugo Riemer, president, Nitrogen Division, Allied Chemical & Dye Corporation, told of how "Industry is Serving the Public Interests." Riemer said that industry is constantly looking for new and improved products, processes, equipments, ways of doing things and has been liberal in establishment of the facilities and atmosphere conducive to study, thought and discovery.

An outstanding feature of the day's program was a timely, well-presented talk on "Agriculture's Role in the American Story," by Dr. Paul D. Sanders, editor, THE SOUTHERN PLANTER, Richmond, Va. Dr. Sanders traced production, food and fiber needs and compared population prior to World War I to the present. He praised the efficiency that had been brought about on farms through improved methods, machinery, better breeding programs and the use of ample quantities of high analysis fertilizers. Sanders was introduced by Paul T. Truitt, executive vice president of the National Plant Food Institute.

"Sampling Commercial Fertilizer (Solids, Solutions and Gases)" was the subject of Dr. F. W. Quackenbush, state chemist, Indiana.

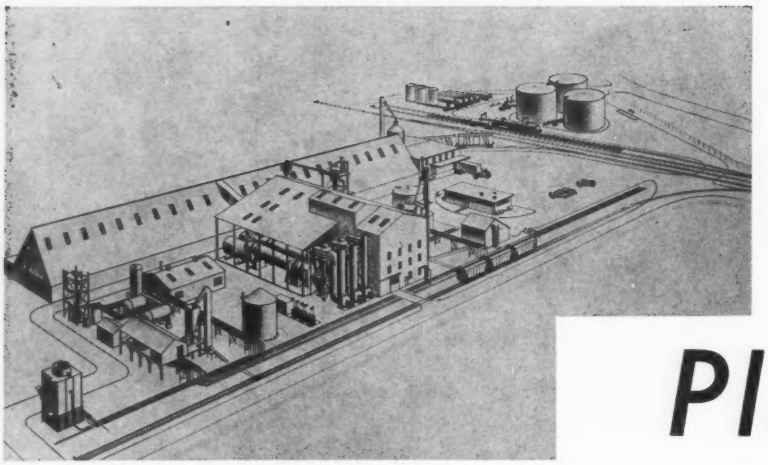
Even though George Enfield, USDA extension agronomist, was unable to be present, his report listing results of the survey conducted among agronomists and horticulturists on changing from oxide to elemental basis for phosphorus and potassium was presented. Here are the results in brief:

Replies: 42 extension horticulturists and 82 extension agronomists from 40 states, 1 territory.

Opinions: Horticulturists and agronomists equally divided. Results from both groups were 3–1 in favor of change. Higher proportion favoring no change was from Northeast and South. In these areas, ratio was 2–1 in favor of change. North Central states favored change 6–1 and West, 3–1.

Number of Years to Make Change: Ranged from 0 to 10 years; average, 3 years. Number of years it would be advisable to have both methods of labeling on bags was from 0–10 years; average, 4 years. Most replies indicated both forms should

(To page 62)

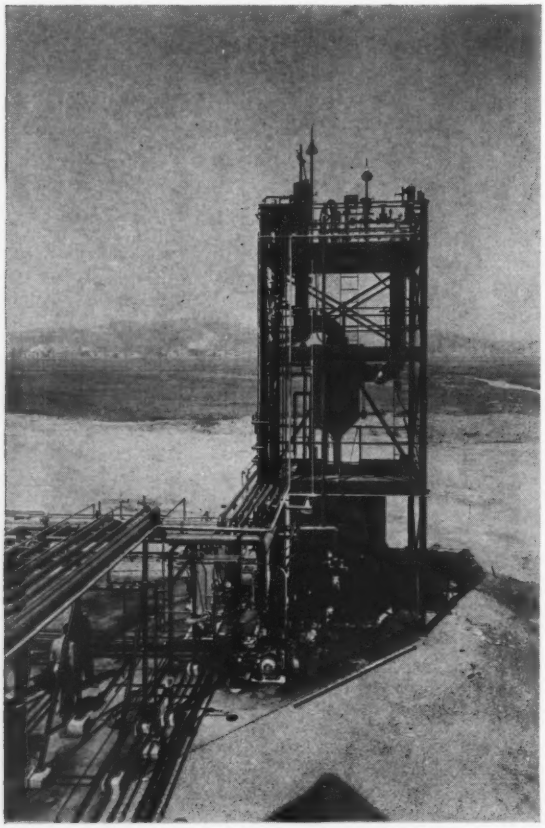


GIANT

Plant Food

CALIFORNIA Spray-Chemical Corp.'s multi-million dollar plant food project—which will be able to produce each day 300 tons of complex pelleted plant food, 300 tons of liquid ammonium nitrate, 150 tons of ammonium sulfate, 200 tons of liquid calcium-ammonium nitrate and 425 tons of aqua ammonia—is being readied to go on stream at Richmond, Calif.

Reactor and separator unit is the heart of the Stengel Process for manufacture of ammonium nitrate solutions. This advanced system, says Calspray, allows wide flexibility and superior control of finished product quality.



Nitric Acid Is Acidulating Agent

A departure from the common practice of using sulfuric acid to make phosphorus available, at the new plant nitric acid is used as the acidulating agent to obtain available phosphoric acid from phosphate rock. The company reports that the acidulating nitric acid has a twofold use. With phosphate values being derived directly from phosphate rock by the addition of one of the plant foods itself, it is possible to manufacture a high concentration of complete fertilizers in a single process and to obtain exceptional product uniformity.

Basic materials for Calspray's operations are supplied by the recently completed ammonia and nitric acid manufacturing plant of the firm's parent company, Standard Oil Company of California, also located at Richmond.

Complex Pelleted Fertilizer Plant

At Calspray's complex pelleted fertilizer plant, a Chemical and Engineering Corp. design utilizing the PEC process, ground phosphate rock is acidulated with nitric acid in a series of specially designed stainless steel reactors. This yields a fluid slurry consisting of a solution of soluble compounds of P_2O_5, calcium nitrate and small amounts of other soluble salts, carrying the insoluble components of the phosphate rock in suspension.

Depending upon formulation, some sulfuric or phosphoric acid is added to the slurry, reacting with part of the calcium to make all the P_2O_5 an available plant food. Finally, anhydrous NH_3 is added to the train to neutralize the mass and to establish the final balance of the binary relationship, nitrogen and P_2O_5.

CALSPRAY

Operation

In the final product, most of the nitrogen is in the form of ammonium nitrate. The P_2O_5 appears as dicalcium phosphate with some P_2O_5 appearing as ammonium phosphate or monocalcium phosphate.

The slurry of the binary continues from the ammoniation stage to a paddle mixer or pregranulator where the potash content, if required in the formula, is added as potassium chloride or potassium sulfate. Here again, complete homogeneity of product is assured as these soluble salts are dissolved in the slurry, thus insuring that every particle of the product will be uniform.

To make the pellets satisfactorily dense and strong, moisture of the mass is reduced by a return of fines which have been screened from the end product. As the paste thickens, spherical pellets are rolled by the action of the granulator and at its discharge end appear like a shower of BB shot.

The conveying system between the granulator and the dryers prepares the pellets to avoid either caking or breakdown in the dryer. After drying, the product is screened, the fines going back to the granulator. The oversize is sent to crushers where it is broken down and added to the fines stream. After cooling in a specially designed, temperature controlled rotary cooler, the product is sent to storage. As a final step, formulations containing high percentages of ammonium nitrate are given a coating, similar to the treatment of ammonium nitrate prills.

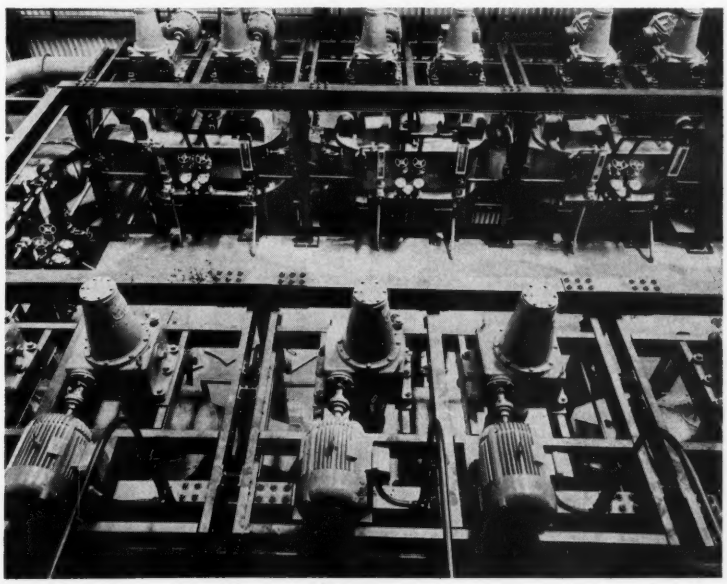
Other Operating Divisions

A second division of the Calspray operation is the ammonium nitrate plant which makes ammonium nitrate solutions to be sold as liquid fertilizers and to provide basic material to the company's plants. Employing the CSC Stengel Process, licensed by C & I, heart of the process is the Stengel reactor where super-heated liquid anhydrous ammonia vapor joins with pre-heated nitric acid to form ammonium nitrate. Heat of reaction evaporates water and produces a highly concentrated solution, which is discharged into a separator which separates steam from solution. Vapors from the top of the separator are sent to a partial condenser to recover any ammonium nitrate carried over, which is then recycled back to the process. Remainder of water vapor is condensed in the total condenser.

Other Calspray divisions manufacture ammonium sulfate and calcium-ammonium nitrate solution.

The company's present marketing area includes the 11 far western states. It says that the decision to enter the plant food manufacturing field on such a large scale was based on an analysis of the potential needs of this marketing area. ▲

RIGHT: Portion of reactor floor in the Calspray plant. BELOW: Conveyor belt carries finished pellets to adjoining bulk warehouse.



Shown here is retiring president Ramsay Smith, (right), congratulating his successor G. E. Willan.

Canadian Agricultural Chemicals Assn. Meets

By Sam Lewis Veitch

DURING the "Indian Summer" days of October 16th, 17th and 18th, the Canadian Agricultural Chemicals Association held its fourth annual meeting and conference at the Sheraton Brock Hotel, Niagara Falls, Ontario, Canada. The attendance was from all parts of Canada, with an excellent representation of all phases of agricultural chemicals.

Association Elects General Manager

The day before the official opening of the meeting, the Canadian Agricultural Chemicals Association elected Michel Chevalier general manager, with offices established at 266 St. James Street, West, Montreal, Quebec. Chevalier has been acting as a secretary to the association since the time it was necessary for Eric Barry to offer his regrets with regard to carrying on. Mr. Barry started with the first meeting of the association and helped out with the duties in order to get the association started. Mr. Chevalier seems to come to the association with a long number of years of work in this particular field of association work, and members of the board had high praise for him and expect the association to go forward under his management.

Just about the time Mr. Chevalier became associated with the organization, the board revamped its scale of membership fees, and has established that for an associate member and those manufacturing up to $250,000 worth of products annually the dues would be $100; from $250,000 to $1,000,000, $200 a year; and $1,000,000 up, $300 a year. These fees are to be established strictly on agricultural articles only, in considering the total dollar sales. Last year the association membership increased from 39 members to 42 members.

President's Report

Ramsey G. Smith of C. A. Smith, Ltd., president of the association, opened the conference with his annual report, which included some interesting progress that had been accomplished during the year in the way of a number of broadcasts used in a liaison manner. He also said that the committee had accomplished a lot with regard to railroad tariff rates.

The Technical Division, under the direction of Dr. E. P. Aikman, Nichols Chemical Company, Montreal, is accomplishing good effects.

Seated at the left are some of the delegates attending the annual CACA banquet.

President Smith also said that the association is now formulating a pattern of direction to be followed in the association's efforts. They will follow along with sales promotion aimed at agricultural representatives instead of at the consumer level. The agricultural representative in Canada is the equivalent to the county agent in the United States. They feel that this would be more beneficial than trying to devote their time aiming at the consumer level. It is the thought of the association that the agricultural representatives under Provincial control have many avenues in which they can help promote the use of agricultural chemicals and can help deal with local problems, which seem to be many through the various areas across the Dominion.

Smith also said that he felt the association will devote more attention to liaison work with the Federal Department of Agriculture and the Department of Health and Welfare. In the past year they have been going in that direction and helped to establish residue tolerances with the Federal department. It was expressed by the association that they felt many members of the industry in Canada were lax in filing reports with the Department of Agriculture and the Food and Drug Directorate. As a matter of fact, only 15 submissions were made during the year. The association feels that the pesticide regulations have to be more rigidly enforced before next season starts, and that tolerances will have to be properly reviewed and established.

Panel Discussion

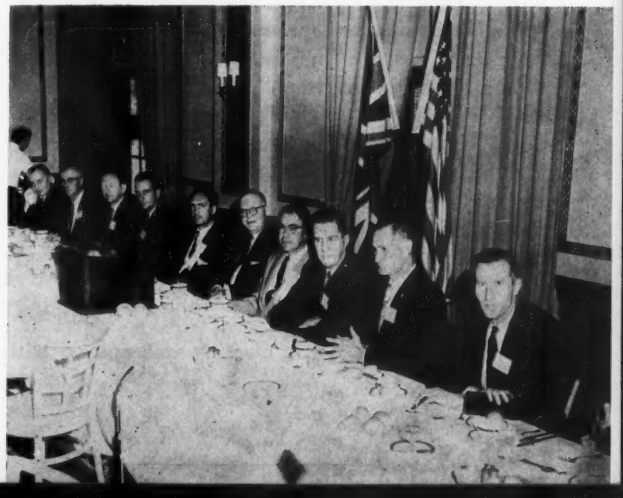
In the afternoon session on the first day of the meeting, a panel discussion was conducted with A. H. Carter of Sherwin-Williams Company of Canada Ltd., Montreal; and on the panel were some of the agricultural chemical authorities of Canada.

S. R. N. Hodgins, director of information service, Department of Agriculture, Ottawa, started the panel off with a discussion on "Agricultural Extension Program in Canada." One of the high points of Hodgins' talk was the fact that he brought to the attention of the group that there were 311 agricultural districts with over 600 workers.

J. A. Garner, director of extension, Ontario Department of Agriculture, Toronto, spoke on "The Role Industry Can Play in Extension." Garner said he felt that the farm situation in Canada was changing from being mere farms to being an industry, and farmers are failing in this category and not taking advantage of their opportunities. "People are using Extension", said Mr. Garner, "more than ever before." He also said that the farm labor situation is getting rather acute in his province, which he felt was the same in other parts of Canada. He found that Extension Service is in need of more help and that agricultural students in colleges are dropping in

Top: S. R. N. Hodgins, Dept. of Agri. Ottawa; G. E. Willan, Pres. of CACA; J. H. Goss, Pres. of Cdn. Gen. Electric; M. E. Ward, 2nd. V. P. CACA; Dr. V. E. Graham, Dean of Agri., Univ. of Saskatchewan; A. W. Hutchison, 1st. V. P. CACA.

Above: W. A. Thomson; W. Newman; W. C. Barrie; distinguished farmers attending the meeting. Below: Distinguished guests at the head table.



number the same as in the United States, and that too few boys realize the importance of agriculture and the opportunities that exist.

The next speaker was Dr. G. S. Cooper, North American Cyanamid Company, whose subject was "Industry Looks at Extension." His opening shot was a blast in view of his stating that in the past there has been too little cooperation between industry and the extension service. He also said that he felt farmers were overly cautious about the adoption of new chemicals and that they would have to be educated to the fact that chemicals could earn them money.

Dr. Cooper thought, too, that there had been a lot of trouble generated through the fact that a number of concerns in the past have employed untrained salesmen, which has caused trouble among the government agencies and also given industry a hard time. In fact, in many places it was a matter of setting the industry back in its growth. He then quickly said that he was glad to report that industry has been changing this pattern, and that he had been establishing farmer meetings and hoped to correct many of the wrong impressions that exist and had found his work encouraging.

"The Role of Education in Agricultural Extension" was the subject of Dr. V. E. Graham, dean, College of Agriculture, University of Saskatchewan. He, too, felt that there was a tremendous need for more agricultural students. He said that he had gone back over the record for a period of 35 years on the graduates of his school and found that 25 per cent were now employed by the government in his province, 25 per cent by the Federal government, 16 per cent were now farming, 17 per cent were in industry, 8 per cent were teaching, and the remaining were either dead or in other businesses.

Dr. Graham also said he thought universities should teach undergraduate students how to impart knowledge—that it was one thing to know the subject and an entirely different matter when it came to translating it to others.

At that point the meeting was opened to questions which were answered by the panel.

Future Predicted

The next speaker of the afternoon was D. Keith Jackson, Monsanto Chemical Ltd. His talk was well illustrated with charts and graphs, and he said it was his considered opinion that pest control sales will double in the next five years in Canada. Another statement made by Mr. Jackson that seemed to interest the group was that he expected, according to the year's forecast, a big grasshopper plague in the next couple of years.

Wednesday Meeting

The second day of the meeting was opened with a talk by R. M. Campbell, vice president and joint managing director, J. Walter Thompson Company of Canada. He said he felt that one of the big jobs necessary for the pesticide manufacturers of Canada was to sell the bankers. He felt that harder work in that direction had to be done in order to get across their ideas and premise. He also said that the world was looking to Canada as leaders, and if Canadians dropped their gunsights for a moment, they would have themselves to blame for whatever resulted.

The next speaker spoke on "A Long Term Evaluation of the Place of Insecticides in Crop Protection." He was Dr. Hubert Martin, director, Science Service Laboratory, Department of Agriculture, London, Ontario. Dr. Martin was very convincing as a speaker who knew his subject from start to finish. He spoke about tracing back some of the intensity phases of the origin of several pesticides, and those who were not agricultural graduates must have gotten lost at the first turn of the road in his talk. Some of the terms he used and slides shown left some of the more experienced somewhat confused. But it's to be said that Dr. Martin clarified his whole talk toward the end by getting into lay language and said that he thought pesticide research had hit its peak except in a broad sense.

"The farmer will pay," Dr. Martin said, "most any price for a pesticide so long as he can make a profit from its use." He then slyly said that he did, however, wonder if manufacturers of DDT were making a profit.

Meeting Relaxed

Wednesday afternoon got away from the serious business, and there was a golf tournament for those who wanted to play golf, and others were taken on a guided tour. In the early evening there was a cocktail party followed by a banquet, the speaker being J. H. Goss, president, Canadian General Electric Company Ltd. And still later in the evening until the small hours of the morning there was a dance in the ballroom.

New Officers and Directors

The following are the newly elected officers and directors of the association: President—G. E. Willan, Niagara Brand Spray Co., Ltd.; 1st vice president—A. W. Hutchison, Shell Oil Co. of Canada Ltd.; 2nd vice president—M. E. Ward, DuPont Co. of Canada Ltd.; secretary—J. H. Elliott, Rohm & Haas Co. of Canada Ltd.; treasurer—S. R. Stovel, North American Cyanamid Ltd.; directors—R. G. Smith, Charles Albert Smith Ltd.; D. D. Stokes, Monsanto Canada Ltd.; J. H. D. Ross, Chipman Chemicals Ltd.; P. E. Redman, National Grain Co. Ltd.; W. M. Larn, Electric Reduction Co. of Canada Ltd. and W. H. Silversides, Interprovincial Co-operatives Ltd. ▲

National Fertilizer Solutions Association Meeting

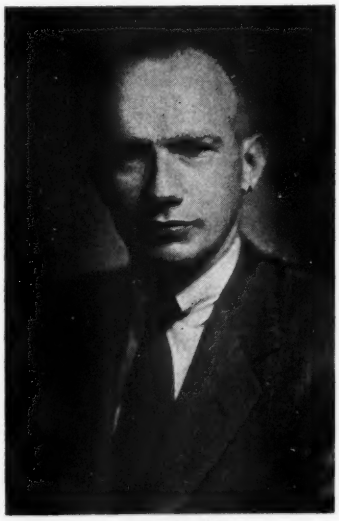
W. R. Allstetter

DURING the annual meeting of the National Nitrogen Solutions Assn. Oct. 16 and 17, some 300 members attending the Sioux City, Iowa, meeting approved a change in the association name. Formerly called National Nitrogen Solution Assn., it is now the National Fertilizer Solution Assn.

Newly elected officers of the association are: E. E. Crouse, president; Don Foster, vice pres.; Wm. B. Parish, secretary; and John White, treasurer.

Highlighting some of the talks presented were W. R. Allstetter, vice pres. of the National Plant Food Institute, who discussed "Production and Use of Fertilizer Nitrogen." In presenting his subject, Allstetter pointed out that "Fertilizer is one of the really great bargains in agriculture today." Continuing, he stated, "We must continue to emphasize the profit possibilities to the individual farmer of proper fertilizer usage." "Fertilizer properly used is a cost cutter. Properly used, and with appropriate acreage reductions, fertilizer can mean more farm income from less crop output.

Mr. Allstetter said that the economic well being of agriculture and the fertilizer industry largely depends on how good a job is done on focusing attention of fertilizer as a bargain, as a profit producer, and a cost cutter.



J. D. Waugh

"The fertilizer industry has for many years tied its sales efforts closely to the work of State Agricultural Experiment Stations," Allstetter said. "This has meant the sale of those fertilizers best suited to the widely varying soils and crops in American agriculture. On most of the cropland in the United States, the application of two or three of the major plant nutrients is needed by growing crops."

On covering the sale and promotion of liquid fertilizers, the association heard J. D. Waugh, director of advertising, Nitrogen Division, Allied Chemical and Dye Corp., discuss the "Effective Use of Advertising." He stressed that emphasis be placed on one name and that continued efforts be made to engrain it on the public, and continue in doing it.

"Promotional Programs" was the subject of a talk presented by C. L. Taylor, field service mgr. of the Michigan Bean Co. Taylor mentioned some of the programs used in promoting his company. He said, "To promote our program, we have used company direct mail to about 6,000 growers. This letter, edited by myself, has been going out to our growers for 13 years. It has been one of the best means of promotion we have developed. In addition, considerable space advertising has been used in local newspapers. Very often local papers will insert news articles about our operations. Large billboard signs have been placed on main road entries to each of our branch town locations.

"All of these promotional activities are important and are very much worthwhile—but—we are convinced they are only door openers. They only open the door for that very important personal farm contact with the grower. It is these personal farmer contacts and field visits that really convince the grower and sell the program. There you have an opportunity to consider his personal problems and point out convincing evidence that your product is doing a job for him."

Members newly elected to the board of directors are: F. Todd Tremblay, Washington Farmers Coop, Seattle; Ernest Harper, Nitrogen Div., Allied Chem. & Dye Corp.; and Donald Webber, Spraying Systems, Bellwood, Ill. ▲

THE rapid expansion in markets and consumption of pesticides over the past ten years is abundant evidence of the success of the methods whereby these compounds have been discovered. By and large, these methods have been empirical, on lines initiated by the chance discovery of activity in a particular compound and involving a systematic search for similar and better activity in compounds of related structure.

The organophosphates provide a familiar example; the basic work of August Michaelis and the Russian Arbuzov on the organic chemistry of phosphorus was extended in the laboratories of Farbenfabriken Bayer and of the American Cyanamid Co. to an extensive range of insecticides now put to practical use in all fields of economic entomology.

The brilliant hunch of Paul Müller that the confirment of lipoid solubility on the moth proofing colorless dyestuff, Mitin, would convert a stomach poison to a contact insecticide resulted in DDT. It was the success of the chlorinated hydrocarbons DDT and BHC which encouraged Julius Hyman and his colleagues of the Velsicol Chemical Corporation to explore the insecticidal potentialities of the diene condensation products of hexachlorocyclopentadiene. There is today a fund of basic information available to guide the search for new pesticides whether they be insecticides based on the biological activity of the derivatives of fluoroethyl alcohol, insecticides or fungicides whose biological activity is centered on the isocyanate group or insecticides, fungicides or herbicides which exploit the toxic properties of the carbamate group. This search is now in active progress in industrial laboratories, for the prize to be gained is attractive provided that legislative requirements on poison hazards do not render the search unprofitable.

Reasons For Effectiveness

But there remain tremendous gaps in our basic knowledge for, with the exception of the organophosphates, little certain is yet known of the reasons why the present day pesticides are biologically active. Even with a fungicide as simple chemically as sulfur, the reasons why this element should be so surprisingly toxic to the powdery mildews are scarcely known. Yet a present outstanding need is a fungicide safer to the plant than sulfur or the dinitro derivatives such as karathane, to remedy the failure of captan and of glyodin against this group of fungi.

The remarkable effect of DDT on insects at once provoked the curiosity of the toxicologists, but today we can still only guess at the processes by which DDT kills insects. Two of the current hypotheses have a merit of experimental support, but whether either or both provide true explanations is still in doubt.

The first arises from the observation of Steinburg and Kearns of the University of Illinois who, in 1952, announced the presence in the haemolymph of DDT-prostrate roaches of a substance other than DDT which produced DDT-like symptoms. The nature of this toxic material has not yet been established.

The origin of the second hypothesis can be traced to Welsh and Gordon who, in 1947, suggested that DDT is absorbed on the lipoprotein sheath of the nerve and so modifies its reaction to divalent ions, particularly those of calcium, that the electrical activity of the nerve is upset. Considerations of the insecticidal activity of modifications of the DDT molecule leads, as I pointed out in a recent article in the ANNUAL REVIEW OF ENTOMOLOGY, to the conclusion that, to be an insecticide of the DDT type, the molecule must have the shape and dimensions which permits it to fit along some interfacial surface within the insect.

Crop Protection With Pesticides Evaluated

By Hubert Martin

Science Service Laboratory
London, Ontario

The next step of the argument was provided by Hoyle, now of the University of Glasgow, who was puzzled by the fact that insect haemolymph has an extraordinarily high potassium ion concentration, around 50 μM/l., a concentration some 10 times that in mammalian blood. In the mammal this high potassium ion concentration would disrupt the nervous mechanism by interference with the electrical properties of the nerve. Hoyle found that the explanation of this difference between insect and mammal is that in the insect the entire nervous system is enclosed in a continuous protective sheath, whereas in the mammal this sheath is discontinuous. If the sheath of the insect nerve is punctured so that it no longer prevents the entry of the potassium ions of the haemolymph, nervous conduction is upset. It is an obvious step to suggest that the insect nerve sheath on which DDT is absorbed is no longer able to keep out the potassium ions.

This intriguing story of how the DDT-poison insect is killed by its own blood is still but an attractive guess awaiting experimental verification, but the reality of the nerve membrane is assured and under the electron microscope its complexity is revealed.

Ionization Of Compounds Important

The greater protection of the insect nerve over that of the mammalian nerve would seem an obstacle to a nerve poison more effective in insects than in mammals. Many powerful drugs are useless as insecticides, and O'Brien of the London Laboratory has recently shown that these differences in toxicity appear when the drug is a compound almost completely ionized at physiological acidities. The drug in its ionized form could evidently reach the mammalian nerve cells whereas, in the insect, the sheath prevents the penetration of the ions. This correlation also provides an explanation for the low toxicity of acetyl choline when injected into the insect's body cavity, an observation which for long has thrown doubt on the idea that the organophosphates are insecticidal because they inhibit the enzymic hydrolysis of acetyl choline. This compound is known to be produced in mammals and to be fatal if allowed to accumulate. Normally it is rapidly destroyed by the cholinesterases, a reaction prevented by the organophosphates and this reaction is generally accepted as the reason for the latter's toxicity.

Extension of this hypothesis to insects is now possible, for it has been shown that acetyl choline is produced in insects and will disrupt the action of the nerve if injected within the insect nerve sheath. It follows that to be insecticidal in this manner, the organophosphate or a product of its degradation within the insect, must be able to pass through the nerve sheath; the moral is that in searching for new insecticidal anticholinesterases among the phosphates and the carbamates, it is well to avoid compounds capable of ionization. One such compound, diethyl β-diethyl aminoethyl phosphorothiolate, has indeed been introduced recently by I.C.I. under the name "amiton" for acaricidal use, and it is not surprising to note that this powerful systemic poison is not of much use against true insects.

On the whole, however, it must be admitted that it would be dangerous to rely, in the search for new insecticides, on our knowledge of the insect toxicology and physiology except in the broader aspects. We can still guide the explorations of the vast region of organic chemistry for pesticides only on the basis of good general knowledge of the factors determining the permeability and on a limited knowledge of the reactions by which enzyme inhibition may be achieved or by which the interfacial properties of membranes may be affected.

The striking success of the search for new pesticides based on this limited knowledge has already been mentioned. The discovery of organophosphates such as malathion and dipterex of high insecticidal activity, yet almost devoid of poison hazards, is a remarkable achievement. But these successes enhance the urgency of a deeper knowledge of why such compounds have these properties and how they upset vital processes.

When it is remembered that enzyme inhibition and membrane interference are but two of the many toxic mechanisms known to underlie the medicinal use of drugs and antibiotics, the potentialities of the organic insecticides become enormous. In the past ten years we have unearthed but a few of the many compounds which most certainly await discovery in the realm of organic chemistry. Once given a clue to the toxic mechanism, the chemist and physiologist are already well-equipped to follow together that clue to the formulation of an agricultural pesticide.

Behind the explorations of the industrial laboratories there is, therefore, the search for new clues to toxic mechanisms. This is basic work for the toxicologist and the physiologist and, at this fundamental level, attention need not be limited to toxic mechanisms but a wider view may be taken of the possibilities of intervening in the processes by which an insect becomes a pest, a fungus a pathogen or a plant a weed. An example or two will serve to give substance to these conjectures.

Hormones Involved In Metamorphosis Discussed

Insect metamorphosis is now known to be hormone controlled, and much progress has already been made towards the isolation and identification of the responsible hormones. Kralson and his colleagues at Tubingen have isolated, in small amounts, a crystalline hormone from silkworm pupae. This active material of m.p. 235–7°, and of probable formula $C_{18}H_{30}O_4$, has been named ecdysone; products of a similar biological activity and chemical nature have been isolated from other insects and from a crustacean. Injection of these products into insect larvae or pupae breaks diapause.

Carroll Williams at Harvard has found, in the abdomen of adult male Cecropia silkworms, a deposit of a yellow oil amounting to 0.2 ml. per moth which prevents or opposes the process by which the pupae is transformed to a moth. This oil is active not only in the Cecropia silkworm, but in other insects such as the cabbage caterpillar, the cockroach and mealworm. As this material is active when applied topically to the pupa cuticle, Williams goes so far as to suggest that the hormone, when identified and synthesized, may prove an effective insecticide. Certainly a knowledge of the nature and molecular

structure of the insect hormones will open up intriguing possibilities in the chemical control of insects.

The reasons why the diet of an insect is so often limited to a single variety of crop plant are scarcely known. Why, for instance, has it been found necessary at the London Laboratory to supply the milkweed bug every few months with milkweed seed in order to keep healthy the stock of this insect reared on dried peanuts? Presumably milkweed seed provides an essential dietary factor, a group of chemicals better known as vitamins. Fraenkel and his coworkers of Illinois have shown that the accessory factor found essential for the mealworm is carnitine $(CH_3)_3{}^+N\text{-}CH_2CH(OH)CH_2 \cdot CO\bar{O}$ (β-hydroxy-γ-trimethylamino)-butyric acid).

Broadly speaking, these vitamins are compounds which the organism itself is unable to synthesize, yet which are essential to the organism as co-enzymes. If the organism is supplied with a compound closely related in molecular structure to the vitamin, and if the compound will replace the co-enzyme to give an ineffective enzyme that compound will be toxic. In the jargon of the physiologist, it is an antimetabolite.

The best known example is the group of sulphonamides which are thought to compete with the vitamin aminobenzoic acid without which a wide range of pathogenic bacteria are unable to reproduce. It was at one time mistakenly thought that lindane was insecticidal because it competed with the vitamin *meso*-inositol. But it is not unreasonable to prophesy a deeper knowledge of the nutritional requirements of insects and of the reasons why so many of the insect pests feed on a restricted range of host plants will provide leads not only to insecticides specifically active against these pests, but to even subtler methods for their chemical control. This argument can be expanded to those fungi and bacteria which are pathogenic to a limited range of host plants.

Indeed, it is already possible to cite a practical example of a control method which probably depends on an essential metabolite. The beet eelworm, like other cyst-forming eelworms, is extremely difficult to control by soil fumigation because its cysts are resistant to chemical attack. The larvae are, however, stimulated by the diffusate of beet roots to emerge from the cysts and the larvae of the beet nematode will develop to maturity only in certain varieties of beet which, unfortunately, include the cultivated varieties. Hijner, of the Netherlands, planted the wild beet, *Beta patellaris*, in soil heavily infested with the sugar beet nematode and found that his May sowing produced, in five months, a reduction by 90 per cent of the content of viable eelworm cysts in that soil.

Mention of pathogenic fungi brings to mind the many known cases in which the fungus which, when grown in culture, produces phytotoxic substances. Indeed, Gäumann postulates that all pathogenic fungi produce toxins. If so, it may be possible to prevent damage to crop plants, not by the use of fungicides which attack the pathogen, but by the use of chemicals which act against the toxins, a principle aptly described by Howard of Rhode Island, as "antidoting the toxin."

Clearly, the chances of the successful use of this principle would be greatly enhanced if the nature of the toxin is known. Work is progressing quietly on these lines and public attention has lately been directed to the extraordinary effects on plant growth of gibberellin, the toxin produced by the fungus responsible for the "Bakanae" (foolish seedling) disease of rice. Ludwig and the chemists at the London Laboratory have been looking at the toxins produced by *Helminthosporium sativum*, a fungus associated with the root rot of barley. The etiology of cereal root rots has for long been a subject of controversy among phytopathologists, but Ludwig is of the opinion that in the seedling blight of barley the toxin produced by *Helminthosporium sativum* is the real culprit. The toxin is necessary because only after the tissue of the seedling plant has been injured by the toxin can the plant become invaded by fungus; not only by *H. sativum*, but by other fungi which have been mistakenly considered to be responsible for the disease.

Antibiotics Useage Encouraging

It is still far too early to suggest chemical methods whereby the *Helminthosporium* toxin can be rendered harmless, but Ludwig has suggested that the success of green manuring for the control of certain soil borne diseases might be due to a removal of the toxin by sorption on the colloidal organic matter incorporated in this process. The ploughing in of such crops as soya bean has long been recommended in the Province of Ontario for the control of strawberry root rots and potato scab. Are we in this process removing the toxin and preventing its attack on the plant roots?

There has long been a vigorous championship of compost as a means of disease and pest control, and the examples given in support of this claim are in general explained by the strong adsorptive properties of soil colloids. Unfortunately, the soil colloids cannot distinguish between toxins injurious to plants and antibiotics injurious to pests or pathogens. Once a knowledge of the nature of toxins and of antibiotics is available, methods more discriminating than green manuring may become available for the control of noxious soil organisms.

The uses in crop protection of antibiotics are now being actively explored, primarily for the control of plant diseases due to soil microorganisms. The discovery of an insecticidal antibiotic by Hannay of the London Laboratory points to new possibilities in this

field. *Bacillus thuringiensis* is now used in California for the biological control of the alfalfa caterpillar. Hannay observed that on sporulation this bacterium produced alongside the spore a diamond-shaped crystal inclusion body. *B. thuringiensis* is a variant of the common soil bacterium, *B. cereus*; Hannay found that most other variants of *B. cereus* pathogenic to insects produced inclusion bodies. He suggested that their formation was related to pathogenicity. The crystal inclusions are readily separated after lysis of the bacteria and proved to be protein in character and dispersable in alkali. These two properties are shared by the polyhedral bodies formed in insects by certain viruses, but electronmicrographs revealed no trace of virus particles.

The protein inclusion of *B. sotto*, a pathogen of silkworm, was isolated by Angus of the Sault Ste. Marie Laboratory, and he found that larvae fed with this protein rapidly developed paralysis; so potent was the protein that the LD 50 was less than .5 micrograms per larvae. It is therefore over 200 times as toxic to silkworm as the toxin derived from *Corynebacterium diphtheriae*, the cause of diphtheria. The insect pathogens of the *B. cereus* group produce disease in a limited number of species, and Angus found that the insects to which *B. sotto* and its crystalline proteins are toxic are those of relatively high gut alkalinity.

This example from the antibiotics must serve as the final illustration of potential developments in the derivation of chemical pesticides. The present catalogue of these products seems capable of infinite extension as our knowledge grows of the possible ways of preventing the attack on plants of insect or fungus and of interfering with the development and reproduction of pest or pathogen.

Within the past fifteen years, the more or less empirical discovery of potential insecticides and herbicides has catalysed development in insect toxicology and plant physiology, subjects which are already providing leads to new and better pesticides. Yet there is today the feeling of pessimism, strong among entomologists, concerning the future of chemical methods of crop protection. The reasons for this discontent are:

1. The high annual charges imposed on grower by cost of chemical and its application;
2. The non-selective action of modern pesticides whereby their use against one pest may produce other and sometimes more costly infestations by other pests;
3. The selection of pest and pathogen resistant to the pesticide.

The objection of cost is largely fallacious, for no pesticide will, in the long run, survive unless its use enables the grower to show a profit. If the chemical enables the grower to earn money from the crop of a particular variety or from a crop produced out of season, that chemical will be used. To judge from the present market prices of 2,4-D and DDT, I am tempted to wonder whether the manufacturer does indeed profit by the sale of these chemicals.

Pesticide Selectivity Covered

The non-selectivity of present day pesticides is a defect which can, as I have tried to show, be cured by the discovery and introduction of chemicals of greater specificity. But there are clearly limits to the degree of specificity which can prove economically sound. A different chemical for each species of insect, fungus or weed would create obvious difficulties both to growers and manufacturers.

The third defect of selection of resistant strains is, I am afraid, insoluble, for it is part and parcel of evolution. The idea that this difficulty is unique to chemical methods of control is mistaken. Resistant varieties such as the rust resistant cereals, which have served the Prairie farmers so well, sooner or later become susceptible to attack when a chance hybridization of the rust fungus produces a biological form able to survive on the cereal host. The hairy varieties of cotton of Rhodesia fell to jassid attack as soon as evolution had selected long-legged jassids.

Even the simple method of rotation, with its restriction on the grower's choice of crop, fails when its long practice has led to the selection of weeds or of eelworm cysts of long resting periods. So also will the continuous and widespread use of a single insecticide select insects of greater resistance to it; the three per cent nicotine dust has given way to the five per cent dust or to another aphicide.

Only to a limited though important range of insects has DDT become useless and, in spite of over ten years of continuous use, DDT is still an insecticide of proven merit. But the DDT resistant fly appears to be an exceptional phenomenon though its significance must never be belittled. Each individual pesticide should be watched for evidence that resistance to it will not develop to the extent and speed with which houseflies resistant to DDT are selected. Meanwhile, ways must be found of countering this selection inevitable with a single method of pest or disease control.

The chances of unwanted selection diminish rapidly with each additional control method. A complete mortality is unobtainable with but one insecticide, but it is of interest that in theory at least it should be possible to secure a 100 per cent kill with a moderate concentration of two suitably contrasted insecticides. A judicious alternation of control methods should permit us to live comfortably with the selection problem. ▲

Presented before the Canadian Agricultural Chemicals Association convention, held Oct. 16–18, at Niagara Falls, Ontario.

Equipment & Supplies

Diesel Engines on 2 Clark Tractor Shovels

Clark Equipment Co.'s Construction Machinery Div. is offering General Motors diesel engines as optional power plants on two models in its Michigan tractor shovel line.

The Michigan 175A is now available with a Detroit Diesel Engine Div. Model 4-71 engine. Rated at 147 brake horsepower at 2200 rpm, the four-cylinder engine has a displacement of 283.7 cubic inches. Maximum torque is 366 lbs.-ft. at 1600 rpm.

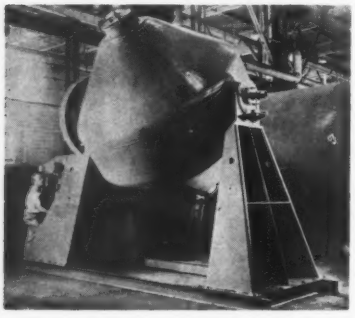
Detroit Diesel's model 3-71 is offered in the Michigan 125A tractor shovel. The three-cylinder, 212.8 cubic-inch engine is rated at 105 bhp at 2200 rpm. Maximum torque is 275 lbs.-ft. at 1500 rpm.

Full specifications are available if you

Circle 372 on Service Card

Pfaudler Markets New Dryer-Blender

Pfaudler Co. is marketing a new 8-foot glassed steel conical dryer-blender which it says can be used for every acid except hydrofluoric



and for alkalis up to *p*H 12 at 212° F. Its glassed steel lining resists adherence and thus reduces cleanup losses and labor and improves heat transfer. Internal pressures range from full vacuum to 20 psi.

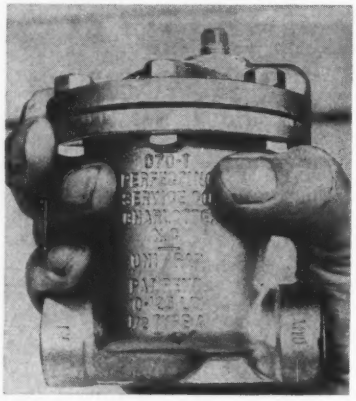
In operation, dryer revolves slowly to provide rapid drying and blending. Hot water or steam is circulated through the jacket to promote drying, with a vacuum exhaust provided to remove vapors.

For additional information

Circle 373 on Service Card

Steam Trap Made in ½ Inch Pipe Size

A small, light-weight bucket type steam trap for unit heaters, small processing machinery and like applications is being manu-



factured by Perfecting Service Co. in ½″ pipe size.

With universal pressure range from 0 to 125 lbs. psi, it has been developed for low pressure-high condensate rate applications where a small, inexpensive trapping unit is needed, the maker reports.

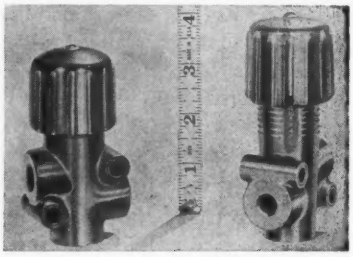
The trap operates on a balanced pressure principle through the function of its Dual-valve, which automatically compensates for differential pressures through a range of 0 to 250 lbs. psi.

For information on this and other Unitraps, which are manufactured in pipe sizes from ½″ through 2″,

Circle 374 on Service Card

High Temperature Valves From Chemtrol

Chemtrol Corp. reports it has developed a new series of general purpose rigid polyvinyl chloride valves designed to withstand high temperatures and pressures too



severe for ordinary plastic materials.

The valves operate up to 170 psi, continuous duty, and in lower pressure systems may be used safely at temperatures up to 170° F., or higher for intermittent duty, says Chemtrol. They have excellent corrosion resistance, constant flow characteristics and immunity to electrolysis and galvanic action.

Available in ⅛″ and ¼″ pipe sizes and ⅛″, ¼″ and ⅜″ O.D. male tube connections, they may be used to great advantage with alloy metal tubing where temperatures and pressures allow, according to the manufacturer. For more details

Circle 375 on Service Card

Pneumatic Signals Convert to DC Current

Mechanical and pneumatic signals can be converted to DC current for long range transmission and then reconverted to pneumatic pressure for actuating control valves or other pneumatic equipment, says Fielden Instrument Div., Robertshaw-Fulton Controls Co. The new system permits low cost remote measurement, indication, recording and controlling of process variables by elimination of electronics and complex circuitry.

For further information on the P-E-P transmission system

Circle 376 on Service Card

Plastic-Steel Mix For Repair Work

Devcon, a combination of 80 per cent steel and 20 per cent plastic, now is being used for rebuilding broken machinery, filling large and small holes in castings, repairing stripped threads and

Large centrifuge repaired with one pound of Devcon. Estimated saving: $1,000 and several days of lost production time, says Devcon Corp.

similar applications, according to Devcon Corp.

The firm says that the material is extremely simple to use. A hardening agent, supplied with every can of material, is added to the plastic, stirred, and then the mixture is pressed or poured into the desired shape. Two hours later, it has hardened and can be machined like steel. For a bulletin

Circle 377 on Service Card

Unloading System Package Assembly

Sprout, Waldron & Co. has announced a package assembly of a pneumatic unloading system for small and medium size requirements. The firm says that since the assembly is being made under quantity production methods, it is economically possible for smaller plants to avail themselves of the advantages of pneumatics previously available only for large material handling requirements.

The "Airo-Flow" assembly consists of a 25 hp motor, rotary positive displacement blower and cyclone separator, blow-through air lock, inlet nozzle, flexible hose and auxiliary piping and fittings. Unloading rate is said to be 6 to 8 tons per hour on light, dry ingredients and 10 to 15 tons per hour for heavier, dry materials.

For further details

Circle 378 on Service Card

New Y & T Dust Protected Lift Truck

Introduction of an improved dust protected, gasoline powered industrial lift truck to provide "trouble free materials handling" in locations containing atmospheric abrasives is announced by Yale & Towne Mfg. Co.

Five features materially reduce harmful effects of abrasive dusts and lint to mechanical and electrical parts. Yale & Towne says that cases on record show engine life can be increased by as much as five times by proper dust protection.

A tandem air cleaning system filters air going into the carburetor and a deflector plate on the bottom of the truck reduces the possibility of foreign particles on the floor being drawn into the engine compartment. Generator and voltage regulator are completely enclosed. More information is available.

Circle 379 on Service Card

Kaiser Booklet on Aluminum Jacketing

An illustrated manual giving detailed information on aluminum insulation jacketing for tanks, vessels and piping systems of petroleum, chemical, power and other process industries has been prepared by Kaiser Aluminum & Chemical Sales, Inc. For a copy

Circle 380 on Service Card

Suppliers' Briefs

Aceto Chemical Co. has been appointed U. S. representative for Imperial Smelting & Refining Corp. of England.

Brooks Rotameter Co. Robert F. Gilman is new production engineer and Henry F. Lorence, newly named advertising manager.

Chase Bag Co. is expanding its Portland, Ore., branch. A new building covering about 25,000 square feet is under construction there on property adjoining the present Chase plant.

Means

Recent Chase appointments include that of J. W. Means as chief chemist of the general laboratory at Chagrin Falls, Ohio, and G R. Anthony as manager of the Central Art Dept.

Clark Equipment Co., Industrial Truck Div., has established a sales and service branch in Chicago at 625 N. Kedzie Ave. "The branch will serve as a yardstick by which we can measure the needs of our dealers," said R. H. Davies, vice pres. The firm has no other factory branch.

Three new dealers: Cromer Industrial Equipt., Inc., Aurora, Ill.; Artin Equipment Co., Hammond, Ind., and Geraghty Industrial Equipment, Inc., Rockford, Ill.

Continental Can Co. has concluded negotiation of a three-year labor agreement with United Steelworkers of America, covering the 14,000 production, maintenance and clerical employees in some 40 of the company's 100 plants.

CLASSIFIED ADVERTISING

NEW RATES . . .
Help wanted, positions wanted, used machinery and business opportunities are now charged at only 10 cents per word, $2.00 minimum. Count box number as five words.

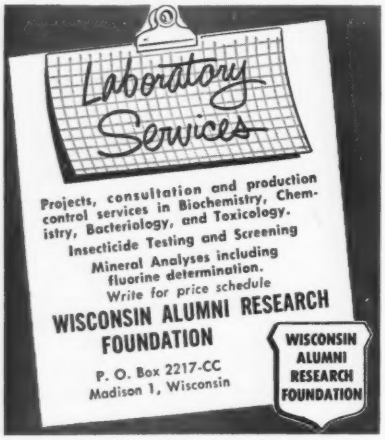
Display ads . . . $15.00 per column inch, minimum of one inch. Ads over the minimum are accepted only in multiples of one half inch.

For prompt results, send your classified ads to Farm Chemicals, 317 N. Broad St., Philadelphia 7, Pa.

Closing date: 10th of preceding month

BUSINESS OPPORTUNITIES

DISTRIBUTORS WANTED— Wilnite, the original meat base warfarin, rat and mouse bait is again on the market. Choice, protected territories available. WILNITE CORPORATION, Box 243 North Platte, Nebr.


Laboratory Services
Projects, consultation and production control services in Biochemistry, Chemistry, Bacteriology, and Toxicology.
Insecticide Testing and Screening
Mineral Analyses including fluorine determination.
Write for price schedule
WISCONSIN ALUMNI RESEARCH FOUNDATION
P. O. Box 2217-CC
Madison 1, Wisconsin
WISCONSIN ALUMNI RESEARCH FOUNDATION

HELP WANTED

FERTILIZER SALES REPRESENTATIVE: Man with agronomy background especially adapted to golf course turf and green house growers to travel middle Atlantic states and midwest. Salary, car and expenses allowed. Send educational background and all particulars together with a non-returnable photograph in first letter. Reply to "570", care FARM CHEMICALS, Philadelphia 7, Pa.

POSITION WANTED

EXPERIENCED PLANT MANAGER desires to relocate. Age 38. Ten years experience as plant and production manager. Experienced in acidulation and granulation in plants with total annual production of over 100,000 tons. References available. Prefer midwest area. For further details address "565", care FARM CHEMICALS, Philadelphia 7, Pa.

Dorr-Oliver. Henry W. Hitzrot succeeds Robert C. Campbell, who recently retired, as assistant to the vice pres. in charge of international administration. J. W. Michener is named special asst. for engineering sales.

Exact Weight Scale Co. promotions: John D. Beeson to plant manager, Mechanical Div.; Thomas Hamilton, procurement officer; and John T. Flanagan, plant superintendent, Mechanical Div.

Fulton Bag & Cotton Mills says its obsolete multi-storied textile bag plant in downtown St. Louis will be closed, and sales headquarters will be housed in the modern, single-storied multiwall plant at 4501 Gustine Ave., St. Louis. Operations of the former plant will be absorbed principally by the firm's Kansas City, Kan. plant, which is being enlarged.

Clarence E. Elsas has been elected Fulton president, succeeding R. O. Arnold who has resigned to devote full time to private interests.

The Frank G. Hough Co. At a special meeting of the board of directors, Frank G. Hough, founder and president, was elected to the newly created office of chairman of the board of directors.

Gilbert

G. A. Gilbertson, former executive vice president and general manager, was elected president and chief operating officer.

Arthur D. Little, Inc. has opened an office in the Roosevelt Bldg., 727 West 7th Street, Los Angeles 17, Calif., headed by Dr. Benjamin S. Mesick.

Minerals & Chemicals Corp. of America. Joseph R. Meehan has joined the Agricultural Chemicals Dept. to handle sales and service activities in connection with its products.

Raymond Bag Corp. appointments: T. H. Bacon, as assistant sales manager, Middleton, Ohio; C. W. Ingham, director of research and development, Chicago; and E. H. Pyle, packaging engineer, Chicago.

Richardson Scale Co. Hart Bandstra has been named advertising manager, responsible for coordinating the firm's entire sales promotion program.

Stedman Foundry & Machine Co. Following the retirement of A. E. Schneider, L. A. Rhodes was named general manager of the firm.

Vulcan Containers Inc. Vern I. McCarthy, Jr., vice president of Vulcan, has been named to serve a six months appointment as deputy director of the Containers & Packaging Div., Business and Defense Services Administration, in the Dept. of Commerce.

Zonolite Co. Richard G. Hartman has been named sales representative, covering southwestern Ohio, southwestern W. Va., eastern Ky. and part of Indiana.

PEST REPORTS

Presented in cooperation with the Economic Insect Survey Section, Plant Pest Control Branch, Agricultural Research Service, USDA.

Alfalfa Aphid Still Spreading

THE spotted alfalfa aphid which, in the last report on the pest in FARM CHEMICALS, had just been found in North and South Carolina and Virginia, continues to spread. Within recent weeks surveys conducted cooperatively and individually by personnel of the Cereal and Forage Insects Section of the Entomology Research Branch, Agricultural Research Service, cooperative survey entomologists and other interested State and Federal workers have found the aphid in several additional states. Following the finds in the Carolinas and Virginia, the aphid was found in Tennessee, South Dakota, Iowa, Minnesota and West Virginia.

As of January 1, 1956, the known distribution of the aphid in this country was 14 states west of the Mississippi and south of a line from Iowa to the state of Washington, excluding Idaho where one country was found infested late in 1955. States east of the Mississippi now known to be infested include Mississippi, Tennessee, Kentucky, Illinois, Florida, Georgia, South Carolina, North Carolina, Virginia and West Virginia.

In the newer infested states recent reports show the spotted alfalfa aphid to be rather widely distributed in Tennessee, North and South Carolina, Virginia, the southwestern part of Illinois, southwestern Minnesota, eastern South Dakota and western and southern Iowa. In West Virginia confirmed specimens have been submitted from one county and unconfirmed specimens from one county.

The behavior of the aphid east of the Mississippi is being watched very closely. Although isolated reports of economic damage have been received from this area the populations generally have remained low. How the pest behaves when it becomes firmly established is of concern to agricultural workers. In some states where the pest was previously established there has been a definite build-up within recent weeks.

Populations in the Salt River Valley of Maricopa county, Arizona, were much higher early in October than during the same period last year. Heavier populations were also from Cochise and Graham counties of that state. Build-ups were reported from Nevada where the aphid has now been taken in Washoe county, which is in the northwestern corner of the state. Damage has been recorded as far north as Salt Lake county, Utah, and heavy populations reported from Colorado. Populations of up to 14,000 per 100 sweeps were recorded from Otero and Pueblo counties, Colorado, and up to 15,000 from Kit Carson county. Populations of over 1,000 per sweep were reported from areas of the Republican Valley in Nebraska. Drought and the spotted alfalfa aphid were responsible for damage to alfalfa in parts of Kansas and Missouri. Northwestern Louisiana reported severe damage in Bossier Parish. It is worthy to note that in Oklahoma where damage was so severe in the spring of this year that populations have remained at a rather low level this fall.

Truck Crop Insect Activity

Onion maggot has caused the most severe damage to onions in Walla Walla, Washington area in history of the onion industry in that state. In late September this pest was still abundant in southwestern Idaho where it was causing heavy damage. Serious infestations causing an estimated loss of 10 per cent of crop have also been reported from Malheur county, Oregon. Infestations of potato tuberworm ranging from slight to severe were discovered in four counties in Utah in early October. The most severe infestations of this serious pest of potatoes were found in Washington and Iron counties with very light populations in Millard and Beaver counties.

Cabbage looper was causing concern in October in several areas. Louisiana reported heavy populations in cole crops in several parishes; Texas had medium to heavy populations in Zavala county on cabbage, cauliflower and pole beans, while the pest was rated the most troublesome insect on cole crops in the eastern Virginia area. Heavy hatching of larvae was noted in tomato and lettuce fields in Imperial Valley of California, and egg-laying activity was heavy in lettuce fields in Dona Ana county, New Mexico, but the pest was under control in most fields in this county. Damage to young lettuce plants has been especially heavy at Yuma, Arizona, where up to 30 eggs per plant have been found. Weekly applications of insecticides were

not adequately controlling the infestations in some cases in this area. The looper was also unusually abundant throughout Maricopa county.

Meadow Spittlebug Outlook in Illinois and Ohio

Fall survey for meadow spittlebug in Illinois showed heaviest infestations, up to 12 adults per sweep, in northern counties. East central counties showed as many as 5.4 spittlebugs per sweep. Highest counts in Ohio were in the northeast, 2.14 adults per sweep, and east central area, 2.05 per sweep.

The pattern of infestation remained about same as 1955 in this state although the general level of infestation increased in every area except the southwest where it remained about like that of last year. In the spring of 1957 infestations of spittlebug nymphs on Ohio legumes are expected to be generally higher than those in 1956.

Ips Beetles Build-up in Pine Areas of Texas and Arkansas

Serious outbreaks of Ips beetles were reported in from 6 east Texas counties in mid-October. Some areas have up to 10 pines per acre dying in these counties. Tree mortality is also being caused in other eastern counties.

A build-up of these beetles has also been reported from the southern half of Arkansas where mortality is occurring mostly in scattered single trees or small groups of trees.

GrasshopperMormon Cricket Control in 1956

Figures recently released by Plant Pest Control Branch show that a total of 2,061,854 acres were treated for control of range grasshoppers this past season and 55,747 acres were baited for Mormon cricket. Range grasshopper control programs were carried out in 15 states west of the Mississippi River with the greatest acreage treated being in New Mexico where spraying was done on 674,614 acres. Texas was second with 282,565 acres.

AAFCO . . . (*From page 47*)

appear for 2–5 years before making complete change to N-P-K.

The following resolution was presented and unanimously adopted by the control officials:

"Whereas, the proposal to change the fertilizer guarantees from an oxide basis for phosphorus and potassium to the elemental basis has received approval by most professional groups concerned; and

"Whereas, the National Association of Commissioners, Directors and Secretaries of Agriculture have requested this Association to prepare a proposal for its consideration,

"*Therefore be it resolved* that the Association of American Fertilizer Control Officials recommends to the respective states that it is essential to American Agriculture for each state law to be amended to permit by July 1, 1960, such change on a gradual but uniform basis as provided in the Model State Fertilizer Law . . ."

The following slate of officers were elected for 1956–57: President, J. D. Patterson, Salem, Ore.; Vice-president, J. J. Taylor, Tallahassee, Fla.; Secretary-Treasurer, Bruce D. Cloaninger, Clemson, S. C. Executive Committee: Retiring president, Dr. M. P. Etheredge; Dr. S. B. Randle, New Brunswick, N. J.; Dr. F. W. Quackenbush, Lafayette, Ind.; E. A. Epps, Baton Rouge, La.; Charles Marshall, Ottawa, Canada.

Isobutyronitrile

Commercial quantities of isobutyronitrile are now available from Eastern Chemical Products, Inc., an Eastman Kodak Co. subsidiary. The compound is being produced by manufacturing facilities of Texas Eastman Co., also a Kodak Div.

The Texas Eastman isobutyronitrile unit was completed early this year, with its initial production going entirely to Geigy Chemical Corp.'s McIntosh, Ala., plant, where it is used in making Diazinon.

Eastman's isobutyronitrile is a water white liquid with a boiling range between 100° C. and 105° C. It contains a maximum of 1.0 per cent aldehydes (as carbonyl) and 0.8 per cent water.

For more information,

Circle 381 on Service Card

ORGANIC FERTILIZER MATERIALS

CASTOR POMACE
BONEMEAL
COCOA SHELLS
TANKAGE
NITROGENOUS TANKAGE
SHEEP MANURE
DRIED COW MANURE
BLOOD

Send us your inquiries

FRANK R. JACKLE

405 LEXINGTON AVENUE NEW YORK 17, N. Y.

Chemicals

Producing N Through Nuclear Fission

Lower cost nitrogen fertilizers may be produced through use of nuclear fission, according to two research scientists at Rensselaer Polytechnic Institute.

Drs. Paul Harteck and Seymour Dondes of the Rensselaer chemistry research staff have reported a new method for the fixation of nitrogen through exposure of hot compressed air to fission recoil energy of uranium 235.

Working with the nuclear reactor at Brookhaven National Laboratories, Upton, L. I., the scientists said that air, when exposed under the right conditions to the ionizing radiations from uranium 235, can be quickly and economically converted into nitrogen oxides.

They estimate that a reactor plant, erected at a cost of $20 million, which would consume $6 million of uranium 235 yearly, could make 70,000 tons of nitrogen dioxide worth about $10 million but convertible into plant food worth $15 million or nitric acid worth $60 million.

New Selective Herbicides Studies

In the near future, herbicides for control of grassy weeds in fields of broad-leaved crops may be available. At the recent meeting of the American Chemical Society in Atlantic City, N. J., Dr. P. C. Hamm, project leader in charge of Monsanto Chemical Co.'s herbicide screening program, said that two classes of chemicals have shown selectivity in destroying seeds of narrow-leaved plants, while sparing varieties such as radishes, beans and peas.

Dr. Hamm said that during the past five years two types of chemicals have been extensively studied at Monsanto because of their outstanding toxicity to germinating grass seeds—N-substituted thioesters of dithiocarbamic acid, and N-substituted alpha-chloroacetimides. Modifications of the two types were synthesized and evaluated as herbicides for germinating grass seeds

Rose Dust Packed In Squeeze Cans

Boyle Midway's Antrol Multi-Purpose Dust is packaged in refillable squeeze cans made by Bradley Container Corp., Maynard, Mass., an Olin Mathieson subsidiary.

Insoluble Zinc & Copper Still Effective

Zinc and copper fertilizer can be applied to soil in insoluble form and still do a good job, according to M. L. Jackson and L. E. DeMumbrum, soil chemists at the University of Wisconsin.

The scientists used infrared light and other soil chemistry techniques to find how the insoluble forms of copper and zinc are used by plants and why they make satisfactory fertilizers. They report even the most insoluble copper and zinc compounds send forth a few ions in solution, and as ions, the metals are free to be used by plants or combined with other materials.

Tiny soil, mineral and organic matter particles, called colloids, gather up some of the metal ions from the solution. Then, more of the metal ions come out of the insoluble material in the soil or that which has been applied as fertilizer. This process goes on and on, with the colloids gathering up copper and zinc ions. On the soil colloids, the metals are held in a form which plants can use.

Aldrin Price Increase

According to F.W. Hatch, manager of the Agricultural Chemicals Division, Shell Chemical Corp., the price of aldrin will increase 10 cents per pound effective January 1, 1957. This is the first price increase for the material since Shell began manufacturing the chemical. The increase will place the carlot price at 90 cents per pound for the technical material.

Univ. of Wisconsin Tests on Pea Seed

Treating pea seed with systemic or contact insecticides does not help pea plants to resist aphids, according to tests by the University of Wisconsin. Systemics used were demeton and four commercial experimental chemicals.

From 13 to 28 days after planting, there were just as many aphids on the treated plants as there were on the untreated ones.

Heptachlor in Italy

Every country has its own variety of insect troubles. In Italy, farmers are plagued with a soil insect, Cleono, which damages sugar beets. The photo above from Velsicol Corp., compares a beet from an untreated field with one from a field treated with heptachlor.

Fertilizer Materials Market

New York

October 12, 1956

Sulfate of Ammonia. While a small price reduction was recently reported in the Midwest, no general price reductions have been made as most producers feel that even if prices are lowered it will not secure any appreciable amount of new business.

Nitrate of Soda. It is understood the importers of nitrate of soda have recently made a small reduction in price.

Ammonium Nitrate. Shipments were going forward on contracts but were said to be behind last year. Demand is expected to pick up within the next thirty days.

Urea. No price changes were noted for urea and only limited amounts of imported urea are now arriving in this country.

Nitrogenous Tankage. The market is still quoted at from $3 to $4 per unit of ammonia ($3.64 to $4.86 per unit N) f.o.b. production points, and demand at the present time is rather limited.

Castor Pomace. No offerings are available at the present time with last sales made on the basis of $37.50 per ton, f.o.b. production points.

Organics. Some organic materials advanced recently because of a large packer strike which cut down available supplies but this strike was settled and a better supply situation is now looked for. Tankage sold at $5.50 per unit of ammonia ($6.68 per unit N) and blood at $6 per unit of ammonia ($7.29 per unit N) f.o.b. Eastern production points. Soybean meal continued easy in price with last sales made on the basis of $45 per ton in bulk, f.o.b. Decatur, Ill. Cottonseed meal showed some independent strength because of a good export demand with last sales made on the basis of $56 per ton, f.o.b. Memphis, Tenn. Linseed meal was steady in price.

Fish Meal. With the fishing season in the North drawing to a close, prices were inclined to the firm side although demand from the feed trade has recently been limited. Last sales made on basis of $135 per ton, f.o.b. fish factories for ground menhaden fish meal.

Bone Meal. This market was stronger but with the settlement of the packer's strike a better situation was looked for. Last sales of both fertilizer and feeding bone meal were made on the basis of $60 per ton, f.o.b. shipping points.

Hoof Meal. Last sales made on the basis of $6 per unit of ammonia ($7.29 per unit N), f.o.b. Chicago.

Superphosphate. This market was more or less a routine affair but manufacturing costs are increasing and while most producers are inclined to absorb these increased costs, it had a tendency to make for a firm price situation.

Potash. Shipments were going forward on contract but most producers noticed the movement was rather slow for this time of year.

Philadelphia

October 12, 1956

The materials market remains dull and inactive. Production continues ahead of demand and inventories are large. Chilean nitrate of soda has been reduced. Fish meal has presently advanced and bone meal holds the $5 per ton advance recently enjoyed. Superphosphate and potash are quiet.

Sulfate of Ammonia. Price has been lowered in the middle west to the $32 per ton price prevailing in the East. The supply is large and demand rather unsatisfactory. There have been suggestions of a lower price in the southwest, but the quality is said to be inferior.

Nitrate of Ammonia. The manufacture of this article is still ahead of last year, although it is said to have slowed down some. Recent quotations showed $64 per ton with some equalization of freight.

Nitrate of Soda. The price of Chilean grade has been reduced $1.75 per ton. Present figures are $52.50 per ton in bulk, and $56 in 100 pound bags.

Blood, Tankage, Bone. With settlement of the strike the market is somewhat easier but quotations remain at $5.50 per unit ammonia ($6.68 per unit N), New York and $6.75, ($8.20 per unit N), Chicago for tankage. Blood is quoted $5.50 ($6.68 per unit N), New York and $5.75 ($6.99 per unit N), Chicago. Bone meal remains strong at $60 per ton. Nitrogenous tankage is offered at less than $4 per unit ammonia ($4.86 per unit N).

Castor Pomace. This remains more or less nominal with the supply extremely limited.

Fish Scrap. This was a little stronger the past week with unground scrap offered at $132 per ton and menhaden meal at $136.

Superphosphate. Production has increased and inventories are larger than this same period last year. No price changes are noted.

Potash. Production continues at about normal, with the surplus going into storage.

FEEDING AND FERTILIZER MATERIALS

(SINCE 1898)

●

SAMUEL D. KEIM

1343 ARCH STREET

PHILADELPHIA 7, PA.

SHUEY & COMPANY, Inc.

Specialty: Analysis of Fertilizer Materials and Phosphate Rock. Official Chemists for Florida Hard Rock Phosphate Export Association. Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemists for National Cottonseed Products Association.

115 E. BAYSTREET, SAVANNAH, GA.

Dictionary of Plant Foods
1955 Edition $1.00 postpaid

The reference booklet or all who are interested in production and use of chemical fertilizers.

Farm Chemicals, 317 N. Broad St., Phila. 7, Pa.

MONARCH SPRAYS

This is our Fig. 645 Nozzle. Used for Scrubbing Acid Phosphate Gases. Made for "full" or "hollow" cone in brass and "Everdur." We also make "Non-Clog" Nozzles in Brass and Steel, and

Stoneware Chamber Sprays

now used by nearly all chamber spray sulphuric acid plants.

CATALOG 6-C

MONARCH MFG. WORKS, INC.

2501 East Ontario Street, Philadelphia, Pa.

The TUMBLING ACTION does it!

BLENDS FASTER...

MIXES BETTER...

AT LOWER COST

Only Munson gives you the exclusive Rotary Batch Mixer that tumbles... turns and folds dry ingredients . . . faster and better... without reducing the size of particles.

The Munson Mixer requires less horsepower, costs less to operate. Flexible design permits modification to meet your plant requirements.

Available in capacities from 20 to 250 cu. ft., the Munson Mixer is unequalled for dry mixing of chemicals, fertilizers, gelatin, antibiotics, insecticides, cereals, glue and other dry ingredients. Where a limited amount of liquid is required, the Munson can be fitted with an internal spray pipe.

Our engineers will be glad to help you solve your mixing problems.

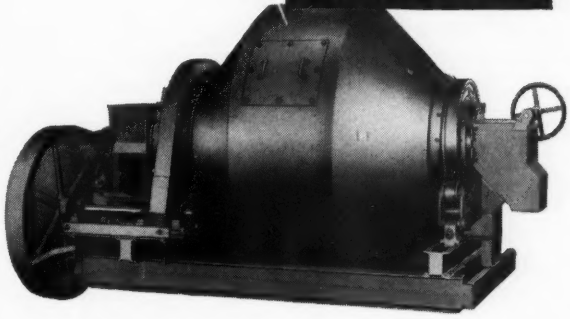
Write today for full information to:

MUNSON MILL MACHINERY CO.

Dept. FC 1156, UTICA, N. Y.

MUNSON

ROTARY BATCH MIXER



by Dr. Melvin Nord

PATENT REVIEWS

Two Patents Issued For Defoliation

U.S. 2,749,227, issued June 5, 1956 to Irvin W. Bales and assigned to Chipman Chemical Co., Inc., describes a method of defoliating cotton with a chlorate base defoliant. Sodium metaborate is added in order to reduce the inflammability of the chlorate. The advantage of the metaborate over borax is its good solubility in water. It has also been found that the sodium metaborate enhances the defoliant action of sodium chlorate.

The metaborate is produced by the reaction of borax and caustic soda, i. e.

$$2NaOh + Na_2B_4O_7 \rightarrow 2Na_2B_2O_4 + H_2O$$

U.S. 2,749,228, issued June 5, 1956 to Waldo B. Ligett and Calvin N. Wolf, assigned to Ethyl Corp., also relates to defoliation. The composition used in this case consists of an N-arylthioamide dispersed in a hydrocarbon oil, and a surface active agent.

Process Described for Water Soluble Ferts.

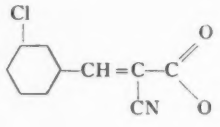
U.S. 2,749,233, issued June 5, 1956 to John E. Malowan and assigned to Monsanto Chemical Co., describes a process for preparing water-soluble nitrogen-phosphorus-containing products which may be used as fertilizers or for other purposes.

The water-insoluble high molecular weight reaction product of phosphorus oxychloride and anhydrous ammonia, obtained at a temperature of 155–250° C., is hydrolyzed by contacting it with 10–35 per cent by weight of water at 80–150° C. in a closed vessel. The hydrolysis product is soluble in water.

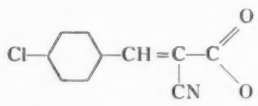
U.S. 2,750,270, issued June 12, 1956 to Marion D. Barnes and assigned to Monsanto Chemical Co., describes a process for the production of soluble phosphates from ammonium sulfate and phosphate rock.

New Class of Plant Growth Regulants

U.S. 2,749,229, issued June 5, 1956 to Waldo B. Ligett and Calvin N. Wolf, assigned to Ethyl Corp., describes a new class of plant growth regulants having the formulae



and



either as free acids or as derivatives.

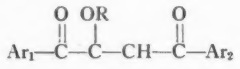
U.S. 2,749,230, issued June 5, 1956 to Murray A. Kaplan and assigned to Bristol Laboratories, Inc., discloses the use of soluble salts of penicillin to increase the growth of plants, either to shorten the time required to reach maturity or to produce an increase in the final size or vigor of the plant.

Concentrating Phos. Minerals from Ores

U.S. 2,750,036, issued June 12, 1956 to Joseph L. Hunter and Harvie W. Breathitt, Jr., assigned to Minerals & Chemicals Corp., of America, describes a flotation process for concentrating phosphate minerals from their ores.

Newcomer Patent Describes Fungicides

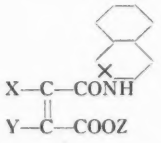
U.S. 2,749,268, issued June 5, 1956 to Jack S. Newcomer and assigned to The Pennsylvania Salt Manufacturing Co., disclosed a group of fungicides having the general formula



where Ar_1 and Ar_2 are phenyl, biphenyl, terphenyl, or naphthyl radicals having up to three substituents (halogen or alkyl radicals up to C-5), and R represents an aliphatic radical up to C-5.

Ethyl Assigned Fungicide Patent

U.S. 2,749,269, issued June 5, 1956 to Waldo B. Ligett, Calvin N. Wolf and Rex D. Closson, assigned to Ethyl Corp., discloses a class of fungicides having the general formula



where X and Y are hydrogen or halogen (at least one being halogen), and Z is hydrogen or a lower alkyl radical.

Somerville Patent Assigned Vanderbilt

U.S. 2,752,282, issued June 26, 1956 to Albert A. Somerville, assigned to R. T. Vanderbilt Co., Inc., describes an agricultural fungicide containing as active ingredients 99 per cent of the ferric salt of a mixture of dimethyl dithiocarbamic acid and 2-mercaptobenzothiazole (in weight ratio of 90:10), and 1 per cent of the zinc salt of the mixture.

Statistics

Copper Sulfate Output, Shipments

Although domestic production of copper sulfate in July was virtually unchanged from June, it was 4 per cent less on a daily average basis, according to the Bureau of Mines, U. S. Dept. of the Interior.

Shipments rose 24 per cent, and were 1,000 tons in excess of production. Stocks decreased 24 per cent, and at the July rate of shipments were sufficient for less than two weeks requirements, the Bureau reported.

'55 Potassium Salts Report Shows Gains

During 1955, production of marketable potassium salts in this country again reached a new high, 3,505,505 short tons which, is 6 per cent above 1954, producers reported to the Bureau of Mines. Both sales and apparent consumption increased 4 per cent over 1954 figures.

Stocks in producers' hands at the end of 1955 were 20 per cent above the previous year's, totaling 630,962 short tons (373,195 tons K_2O content).

July Superphosphate

Shipments of superphosphate and other phosphatic fertilizers during July totaled 95,986 tons or an increase of 17 per cent over the June volume. At the end of July, stocks on hand were reported to be four per cent more than those held on June 30.

Limestone Use Up

In 1955, soils on our nation's farms received an application of 20,498,609 tons of agricultural limestone, 1.5 million tons more than in 1954, reports National Agr. Limestone Institute.

Mines Bu. Reports on Phosphate Rock in '55

Mine production of phosphate rock ore in the U. S. in 1955 decreased 13 per cent to 39.7 million long tons, according to reports by producers to the Bureau of Mines.

Total marketable output declined 11 per cent. Decreases in marketable production of 16 and 10 per cent, respectively, were registered by Florida and Tennessee, while the Western states showed a 17 per cent increase.

Apparent consumption of the rock rose 2 per cent above 1954 to 11.1 million long tons. Both imports and exports, as reported to the bureau, were 4 per cent lower than in 1954.

Estimated world production of phosphate rock was said to have increased 2 per cent in 1955, compared with the previous year. Europe, Asia, Africa and Oceania all reported increased output.

Production — July, 1956

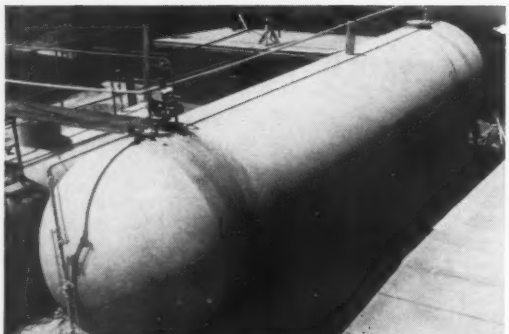
Compiled from Government Sources

Chemical	Unit	July 1956	July 1955	June 1956
Ammonia, synth. anhydrous	s. tons	[1]253,361	236,759	262,903
Ammonia liquor, coal & coke (NH_3 content) (Including diamm. phosphate & ammon. thiocyanate)	pounds	2,114,312	2,718,600	2,825,548
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	129,296	123,817	124,949
Ammonium sulfate				
synthetic (technical)	s. tons	81,743	79,948	94,277
coke-oven by-product	pounds	—	157,711,676	158,460,603
BHC (Hexachlorocyclohexane)	pounds	8,630,525	6,531,148	8,516,747
Gamma content	pounds	1,435,215	1,070,486	1,389,379
Copper Sulfate (Gross)	s. tons	6,196	6,507	6,252
DDT	pounds	11,927,462	11,334,015	12,099,684
2,4-D Acid	pounds	—	2,795,522	—
esters and salts	pounds	*1,916,407	—	3,066,534
esters and salts (acid equiv.)	pounds	*1,484,060	2,001,968	2,181,436
Lead Arsenic (acid and basic)	s. tons	337	[2]	422
Phosphoric acid (50% H_3PO_4)	s. tons	235,900	197,401	299,338
Sulfur, Native (Frasch)	l. tons	621,130	487,633	565,002
Recovered	l. tons	43,400	33,900	*38,200
Sulfuric acid, gross (100% H_2SO_4)	s. tons	1,129,556	1,121,908	1,269,691
Superphosphate (100% APA)	s. tons	136,675	93,769	*169,418
Normal (100% APA)	s. tons	77,329	62,510	92,137
Enriched (100% APA)	s. tons	[2]	2,795	1,177
Concentrated (100% APA)	s. tons	45,338	28,335	62,619
Wet Base (100% APA)	s. tons	[2]	129	50
Other phos. fertilizers	s. tons	13,181	11,489	*13,435
2,4,5-T Acid	pounds	*489,796	130,515	426,765
Urea	pounds	51,566,620	—	61,853,120
Calcium Arsenate	pounds	4,044	[2]	2,010

* Revised. [1] Includes quantities for 1 plant previously not reporting. [2] Withheld to avoid disclosing figures for individual establishments.

Specialists in
Magnesia for Agriculture
EMJEO (80/82% Magnesium Sulphate)
Calcined Brucite (fertilizer grade) 65% MgO
POTNIT
(95% Nitrate of Potash) for
Specia. Mixtures and Soluble Fertilizers
Other Fertilizer Materials
BERKSHIRE
ISCO
Insecticides—
Fungicides
Mercury Compounds
for Agricultural Use
Dithiocarbamates
Ferric—Zinc
EXPORT—IMPORT

BERKSHIRE CHEMICALS INC
GRAYBAR BUILDING
420 LEXINGTON AVENUE • NEW YORK 17
LExington 2-5959 • "BERKSKEM" New York
55 New Montgomery St. • San Francisco 5, Cal.
Philadelphia • Boston • Cleveland • Chicago



WELDED ALUMINUM TANKS

● With over a century of experience in metal fabrication, we were pioneers in the fabrication of aluminum, building the *first* aluminum tank for nitrate solutions. (Incidentally, this tank is still in service.)

We can supply you with welded aluminum tanks or pressure vessels for the storage or processing of agricultural chemicals, built to ASME code specifications to meet all insurance requirements.

Conventional or special design tanks, shop built up or field erected, using flat, flanged and dished, or hemispherical heads, can be built to your specifications. Write for a copy of our booklet, *Tanks and Equipment for the Plant Food Industry.*

Elevated Tanks, Pressure Vessels, Chemical and Processing Equipment from Aluminum, Stainless and Carbon Steel, Monel and Other Alloys.

R. D. COLE MANUFACTURING CO.
COLE
NEWNAN, GEORGIA

R. D. COLE MANUFACTURING CO.
NEWNAN, GEORGIA

Chilean Nitrate Producers Get $28 Million Loan

IN AN effort to cut costs and increase efficiency of their operations, two Chilean nitrate producing companies have recently received loans from the Export-Import Bank amounting to $28 million. Involved in the appropriation are two of Chile's largest producers: Anglo-Lautaro Nitrate Corp. receiving $16 million, and $11.8 million for Cia. Salitrera del Tarapaca y Antofagasta.

Credits involved in the expansion program will allow purchase in the United States of crushing, process and refining equipment for nitrate ores. In addition railroad and related engineering services will be procured.

Results of the expansion programs of the two companies, it was added, are expected to enable Chile to maintain its share of the World nitrate market which has been steady for some years although the market has shifted. Production of synthetic nitrates has caused a comparative reduction in demand for Chile's nitrates in some areas, espepecially in the United States, but demands in other market areas, particularly Europe, have increased.

Anglo-Lautaro operated nitrate plants at Maria Elena and Pedro de Valdivia, using the Guggenheim processes, including solar evaporation. The company intends to increase the number of solar evaporation ponds which will permit greater recovery of nitrate from the residues of the Guggenheim process.

In addition, large shovels, ore cars and electric locomotives will be purchased to improve the mining and transportation of ore and nitrate to the Port of Tocopilla.

The expansion program of the Tarapaca company is designed to triple the production of its principal plant at Victoria, in northern Chile. Extensive areas of nitrate deposits representing one of the largest known reserves in the world are located within operating range of the Victoria plant and the company's program is expected to permit economical exploitation of these reserves.

By these improvements the plants will be able to reduce operating costs with increased production in these plants in order to meet the increasing worldwide competition which has resulted in reduced selling prices for Chile's premium product. Moreover, increased export sales of Chilean nitrate anticipated in world markets should make possible a substantial net addition to the country's dollar position. ▲

POTASH
SUPERPHOSPHATE
UREA, 45½% & 46% N.
DI-N-CAL—20.5% N.
(Calcium Ammonium Nitrate)
BAGS—
Paper and Burlap

ALEX. M. McIVER & SON
Brokers
Fertilizer Materials
Industrial Chemicals
P. O. BOX 155 Ph. 3-4828-29
CHARLESTON, S. C.
"Since 1915 your most efficient channel for sales and purchases of Fertilizer Materials"

CHI-ORGANIC
(Chicago Activated Sludge)
HYNITE TANKAGE
CASTOR POMACE
GROUND
COTTON-BUR ASH
(38-40% K_2O Potash)

STEDMAN
FERTILIZER PLANT EQUIPMENT

All Steel Self Contained Fertilizer Mixing and Bagging Units
Complete Granulating Plants
Batch Mixers—Dry Batching—Pan Mixers—Wet Mixing
Tailings Pulverizers—Swing Hammer and Cage Type
Dust Weigh Hoppers
Vibrating Screens
Acid Weigh Scales
Belt Conveyors—Stationary and Shuttle Types
Batching Systems
Bucket Elevators
Hoppers and Chutes

STEDMAN FOUNDRY & MACHINE COMPANY, INC.
Subsidiary of United Engineering and Foundry Company
General Office & Works: AURORA, INDIANA Founded 1834

Alphabetical List of Advertisers

Adelphia Hotel, Philadelphia, Pa. —
American Agricultural Chemical Co., New York City. —
American Potash & Chemical Corp., Los Angeles, Calif. 28
Armour Fertilizer Works, Atlanta, Ga. —
Ashcraft-Wilkinson Co., Atlanta, Ga. Back Cover, 19, 32
Atkins, Kroll & Co., San Francisco, Cal. —

H. J. Baker & Bro., New York City. —
Baughman Mfg. Co., Jerseyville, Ill. —
Berkshire Chemicals, Inc., New York City. 68
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans. —
Bradley & Baker, New York City. 23
Bradley Pulverizer Co., Allentown, Pa. —
Burlap Council, New York City. —

Chase Bag Co., Chicago, Ill. —
Clark Equipt. Co., Benton Harbor, Mich. —
Clover Chemical Co., Pittsburgh, Pa. —
E. D. Coddington Mfg. Co., Milwaukee, Wis. —
Cole, R. D. Mfg. Co., Newman, Ga. 68
Commercial Solvents Corporation, New York City. —
Crowley Tar Products Co., New York City. —

Davison Chemical Co., division of W. R. Grace & Co., Baltimore, Md. 9
Duval Sulphur & Potash Co., Houston, Tex. 32

Edwards Laboratory, Norwalk, Ohio. —
Escambia Chemical Corp., Pensacola, Fla 19
Exact Weight Scale Co., Columbus, Ohio. —

Finco, Inc., North Aurora, Ill. —

Geigy Agricultural Chemicals, New York City. —
Grand River Chem. Div., Deere & Co., Tulsa, Okla. —

Highway Equipment Co., Cedar Rapids, Ia. —
Hough, The Frank G. Co., Libertyville, Ill. 31
Hudson Pulp & Paper Corp., New York City. 39

Indian Jute Mills Association, New York City. —
Industrial Marking Equipment —
International Mineral & Chemicals Corp., Chicago, Ill,
Spec. Prod., Phosphate Chemicals Div. 12, 13
Phosphate Materials Div. —
Potash Div. —

Jackle, Frank R., New York City. 62
Joy Manufacturing Co., Pittsburgh, Pa. 20

Keim, Samuel D., Philadelphia, Pa. 65
Kraft Bag Corporation, New York City. 27

Link-Belt Co., Chicago, Ill. 3
Ludlow-Saylor Wire Cloth Co., St. Louis, Mo. —

Alex M. McIver & Son, Charleston, S. C. 69
Mississippi River Chem. Corp., St. Louis, Mo. —
Monarch Mfg. Works, Inc., Philadelphia, Pa. 65
Munson Mill Machinery Co., Utica, N. Y. 65

National Lime & Stone Co., Findlay, Ohio. —
National Potash Co., New York City. Second Cover
Nitro-Form Agricultural Chemicals, Woonsocket, R. I. —
Nitrogen Division, Allied Chemical & Dye Corp., New York City. 33–36

Pennsylvania Salt Mfg. Co. of Wash., Tacoma, Wash. —
Phelps-Dodge Refining Corp., New York City. —
Phillips Chemical Co., Bartlesville, Okla. 21
Pioneer Pyrophyllite Producer, Torrance, Calif. —
Potash Co. of America, Washington, D. C. Third Cover
Poulsen Co., Los Angeles, Calif. —

Schmutz Mfg. Co., Louisville, Ky. 40
Shell Chemical Corporation, New York, N. Y. —
Shuey & Company, Inc., Savannah, Ga. 65
Sinclair Chemicals, Inc., New York City. —
Sohio Chemical Co., Lima, Ohio. —
Southwest Potash Co., New York City. 25
Spraying Systems Co., Bellwood, Ill. —
Stedman Foundry and Machine Co., Inc., Aurora, Ind. 69
Stephens-Adamson Mfg. Co., Aurora, Ill. —
Sturtevant Mill Co., Boston, Mass. 7

Tennessee Corporation, Atlanta, Ga. 1
Texas Gulf Sulphur Co., New York City 41
Tractomotive Corp., Deerfield, Ill. —

Union Bag-Camp Paper Corp., New York City. 16, 17
U.S. Graphite Co., Saginaw, Mich. 11
U.S. Phosphoric Products Division, Tennessee Corp. Tampa, Fla. 23
United States Potash Co., New York City. 5

Wisc. Alumni Research Foundation, Madison, Wisc. 60
Woodward & Dickerson, Inc., Philadelphia, Pa. —

editorial

ENROLLMENT is at an all time high in our schools of higher learning these days. But with all of the overcrowded classrooms and facilities we are still being constantly reminded of our shortcomings in producing scientists and technicians for our current needs and country's future. Why?

We believe Arthur D. Weber, dean of agriculture at Kansas State College, in a recent report has analyzed the problem as far as agriculture is concerned and accurately states the main reason for the shortages of technical workers in agriculture and its related fields today: Neither youth nor adults are aware of the expanded opportunities in agriculture.

Dean Weber discussed how with the steadily increasing demand for food has come expanding opportunities for agriculturally-trained youth. Scientific changes in agriculture affecting many industries related to agriculture have resulted in the creation of many new and challenging opportunities.

Needed in our industry to help the farmer increase his yields and income are such varied professional men as agronomists, chemists, entomologists, botanists, pathologists and many others, without which our future would be unstable in the ability of our agriculture to feed a steadily increasing population, estimated to reach 255 million by 1975.

To further complicate our shortage of technically trained manpower are the tremendous requirements of the agricultural chemicals industry for the same personnel needed in agriculture. Recently, J. W. Britton of Dow Chemical Co., speaking before the ACS meeting in Atlantic City, N. J., told of phenomenal growth in the pesticide field. In 1939, $40 million in sales resulted, while in 1956 it is anticipated sales will reach $440 million. Each year the growth curve increases an additional 10 per cent, and still we only supply 17 per cent of the farm chemicals required.

Today we realize only 30 per cent of the animal disease market in sales of compounds, 17 per cent in necessary insecticides and only 9 per cent in the chemicals essential in controlling plant diseases. Regarding herbicides, we realize only 5 per cent of the potential market in spite of all the interest and discussion.

To properly compete in the future, companies must devise and market new, better and more economical products to maintain their competitive positions. Research, development and sales all require the utmost in technically trained workers. From the research chemist in the laboratory to the field serviceman—all contribute in maintaining the company's position in trying to increase the potential market which lies ahead.

Covering this country's and the world's future sources of food, Britton highlighted on some problems which may seem distant, but could in reality serve as major obstacles. Food from the sea could in all likelihood require us to investigate a new and fertile field in the control of predatory fish with newly devised pesticides. In addition, new areas of fertilizer application could be developed here. And in the control of unwanted aquatic plants, chemicals designed to hinder their growth would be required.

All of these developments will require technically trained personnel, and the situation today does not indicate that the supply of graduating students in agriculture will increase to a level which will meet future industry requirements.

We do feel encouraged, however, from a statement given by W. W. Allen, retiring president, at the recent NAC meetings who covered this serious problem by stating, "We need good men. We need trained men. In the year ahead NAC expects to go to work to interest more young men of ability in the opportunities and challenges of this business and to provide more adequate education toward this end. Whether your own company feels this pinch directly or indirectly, the movement of more good men with better training into our industry will place the entire industry on a better footing, and will be helpful to all."

NOT only does the agricultural chemicals industry feel the pinch in procuring a sufficient supply of technically trained manpower for future requirements, but so does every industry in our society today.

Possibly an answer may be found in the program of The Texas Company, and those of other manufacturers doing business of a technical nature. J. H. Pipkin, vice president of The Texas Company, recently in an address at Tulane University outlined the company's plan of assistance—helping schools of higher learning in the form of aids to education, 160 scholarships and 140 grants in aid of $1,500 each to colleges and universities.

In presenting the plans of aid he continued by stating that American colleges and universities "are the primary source for the ideas, the vision and the inspiration by which our young people must be motivated and guided if the American way of life is to survive."

To further elaborate on the problem, General J. E. Hull, president of the Manufacturing Chemists' Association, pointed out that the country will be short 457,000 scientists and engineers by 1965, and the chemical industry alone will be in need of 93,000 scientists and engineers. In alleviating the situation, an educational program at the high school level will be carried out to stimulate an interest in science.

With such efforts from our various industrial associations, companies and noted citizens, we should feel confident that our country's position in the world will be safeguarded from the standpoint of providing for itself and maintaining its reputation in technology.

W. P. S., *Editor*

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Shell Chemical Co., Agr. Chem. Div., N.Y.C.

AMMONIA—Anhydrous and Liquor
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Escambia Chem. Corp., Pensacola, Fla.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Mississippi River Chem. Co., St. Louis, Mo.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Sinclair Chemicals, Hammond, Ind.
Sohio Chemical Co., Lima, O.

AMMONIUM NITRATE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Escambia Chem. Corp., Pensacola, Fla.
Mississippi River Chem. Co., St. Louis, Mo.
Phillips Chemical Co., Bartlesville, Okla.

AMMONIUM SULFATE
See Sulfate of Ammonia

AMMONIUM SULFATE NITRATE
Atkins, Kroll & Co., San Francisco, Calif.

BAGS—BURLAP
The Burlap Council, New York City
Chase Bag Co., Chicago, Ill.

BAGS—COTTON
Chase Bag Co., Chicago, Ill.

BAGS—Multiwall-Paper
Chase Bag Co., Chicago, Ill.
Hudson Pulp & Paper Corp., N.Y.C.
Kraft Bag Corporation, New York City
Union Bag—Camp Paper Corp., New York City

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG PRINTING MACHINES
Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES
E. D. Coddington Mfg. Co., Milwaukee, Wisc.
Kraft Bag Corporation, New York City
Stedman Foundry and Machine Co., Aurora, Ind.
Union Bag—Camp Paper Corp., New York City

BHC AND LINDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pennsylvania Salt Mfg. Co., of Wash., Tacoma, Wash.

BIN LEVEL CONTROLS
Stephens-Adamson Mfg. Co., Aurora, Ill.
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.

BIN DISCHARGERS
Stephens-Adamson Mfg. Co., Aurora, Ill.

BONE PRODUCTS
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID
American Potash & Chemical Corp., Los Angeles, California
Woodward & Dickerson, Inc., Philadelphia, Pa.

BOX CAR LOADERS
Stephens-Adamson Mfg. Co., Aurora, Ill.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son., Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BULK TRANSPORTS
Baughman Mfg. Co., Jerseyville, Ill.
Highway Equipment Co., Cedar Rapids, Ia.

CALCIUM AMMONIUM NITRATE
Atkins, Kroll & Co., San Francisco, Calif.
McIver & Son, Alex. M., Charleston, S. C.

CALCIUM ARSENATE
American Agricultural Chemical Co., N. Y. C.

CALCIUM NITRATE
Atkins, Kroll & Co., San Francisco, Calif.

CAR PULLERS
Stephens-Adamson Mfg. Co., Aurora, Ill.

CARS AND CART
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

CHEMISTS AND ASSAYERS
Shuey & Co., Inc., Savannah, Ga.

CHLOROBENZILATE
Geigy Agr. Chems. Div. Geigy Chem. Corp. N.Y.C.

CHLORDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.

CLAY
Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., New York City
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Finlay, Ohio
U. S. Graphite Co., Saginaw, Mich.

CONVEYORS
Baughman Mfg. Co., Jerseyville, Ill.
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Joy Mfg. Co., Pittsburgh, Pa.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.

COPPER SULFATE
Phelps-Dodge Refining Corp., New York City
Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

DDT
Ashcraft-Wilkinson Co., Atlanta, Ga.
Geigy Agr. Chems., Geigy Chem. Corp., N.Y.C.

DIAZINON
Geigy Agr. Chems. Geigy Chem. Corp., N.Y C.

DIELDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Shell Chem. Corp., Agr. Chem. Div., N.Y.C.

DILUENTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

DITHIOCARBAMATES
Berkshire Chemicals, New York City

ELEVATORS
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Stephens-Adamson Mfg. Co., Aurora, Ill.

ENDRIN
Shell Chem. Corp., Agr. Chem. Div., N.Y.C.

ENGINEERS—Chemical and Industrial
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

FERTILIZER—Liquid
Clover Chemical Co., Pittsburgh, Pa.

FERTILIZER—MIXED
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.

FILLERS
Bradley & Baker, N. Y. C.

Fish SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH
Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES
American Agricultural Chemical Co., N. Y. C.
Berkshire Chemicals, New York City
Tennessee Corp., Atlanta, Ga.

HERBICIDES
American Potash & Chemical Corp., Los Angeles, California

HOPPERS & SPOUTS
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES
American Agricultural Chemical Co., N. Y. C.
American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Fairfield Chem. Div., Food Mach. & Chem. Corp., New York City
Geigy Agr. Chems., Div. Geigy Chem. Corp., N.Y.C.
Pennsylvania Salt Mfg. Co., of Wash., Tacoma, Wash.
Shell Chem. Corp., Agr. Chem. Div., N.Y.C.

IRON CHELATES
Geigy Agr. Chems., Div. Geigy Chem. Corp., N.Y.C.

IRON SULFATE
Tennessee Corp., Atlanta, Ga.

LABORATORY SERVICES
Wisc. Alumni Research Foundation, Madison, Wisc.

LEAD ARSENATE
American Agricultural Chemical Co., N.Y.C.

LIMESTONE
American Agricultural Chemical Co., N.Y.C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Finlay, Ohio

MACHINERY—Acid Making and Handling
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Acidulating
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Bradley Pulverizer Co., Allentown, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Idn.
Sturtevant Mill Co., Boston, Mass.

Buyers' Guide

MACHINERY—Material Handling
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Clark Equipt. Co., Construction Mach. Div., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Joy Mfg. Co., Pittsburgh, Pa.
Link-Belt Co., Chicago, Ill.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora Ind.
Stephen-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.
Tractomotive Corp., Deerfield, Ill.

MACHINERY—Mixing and Blending
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Munson Mill Mach. Co., Utica, N. Y.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Mixing, Screening and Bagging
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Power Transmission
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY
Superphosphate Manufacturing
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MAGNESIUM SULFATE
Berkshire Chemicals, New York City

MANGANESE SULFATE
Tennessee Corp., Atlanta, Ga.

MANURE SALTS
Potash Co. of America, Washington, D. C.

METHOXYCHLOR
Geigy Agr. Chems., Div. Geigy Chem. Corp. N.Y.C.

MINOR ELEMENTS
Geigy Agr. Chems., Div. Geigy Chem. Corp. N.Y.C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Munson Mill Mach. Co., Utica, N. Y.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

NITRATE OF POTASH
Berkshire Chemicals, New York City

NITRATE OF SODA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
McIver & Son, Alex. M., Charleston, S. C.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Escambia Chem. Corp., Pensacola, Fla.
Lion Oil Company, El Dorado, Ark.
Mississippi River Chem. Co., St. Louis, Mo.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Sinclair Chemicals, Hammond, Ind.
Sohio Chemical Co., Lima, O.

NITROGEN MATERIALS—Organic
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Sons, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PARATHION
Ashcraft-Wilkinson Co., Atlanta, Ga.

PHOSPHATE ROCK
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID
American Agricultural Chemical Co., N. Y. C.

PLANT CONSTRUCTION—Fertilizer and Acid
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston Mass.

POTASH—Muriate
American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
Bradley & Baker, N. Y. C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
National Potash Co., N. Y. C.
Potash Co. of America, Washington, D. C.
United States Potash Co., N. Y. C.

POTASH—Sulfate
American Potash & Chemical Corp., Los Angeles, California
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

REPAIR PARTS AND CASTINGS
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers
Exact Weight Scale Co., Columbus, O.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS
Blue Valley Equipt. Mfg. & Eng. Co., Topeka, Kans.
Ludlow-Saylor Wire Cloth Co., St. Louis, Mo.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

SHOVEL LOADERS
Clark Equipt. Co., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Tractomotive Corp., Deerfield, Ill.

SOILTEST EQUIPMENT
The Edwards Laboratory, Norwalk, O.

SPRAYERS
Finco, Inc., N. Aurora, Ill.

SPRAYS
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.
Baughman Mfg. Co., Jerseyville, Ill.

SPREADERS, TRUCK
Baughman Manufacturing Co., Jerseyville, Ill.
Highway Equipment Co., Cedar Rapids, Ia.

STORAGE TANKS
Cole, R. D., Manufacturing Co., Newnan, Ga.

SULFATE OF AMMONIA
American Agricultural Chemcal Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TANKS—NH3 and Liquid N
Cole, R. D., Manufacturing Co., Newnan, Ga.

TOXAPHENE
Ashcraft-Wilkinson Co., Atlanta, Ga.

TRUCKS—SPREADER
Baughman Mfg. Co., Jerseyville, Ill.
Highway Equipment Co., Cedar Rapids, Ia.

UREA & UREA PRODUCTS
Atkins, Kroll & Co., San Francisco, Calif.
Bradley & Baker, N. Y. C.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Nitrogen Div. Allied Chemical & Dye Corp., N.Y.C.
Sohio Chemical Co., Lima, O.

UREA-FORM
Nitro-Form Agricultural Chemicals, Woonsocket, R. I.

VALVES
Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE
Tennessee Corp., Atlanta, Ga.

GIANT SERVANT OF AGRICULTURE

The best fertilizers require the best materials. The best potash products are P. C. A.'s new 60% standard, new 60% granular, sulphate of potash, and chemical grade muriate.

Quick Service—High Quality

P.C.A.
The SALT of the EARTH
RED MURIATE

POTASH COMPANY OF AMERICA
CARLSBAD, NEW MEXICO.

General Sales Office . . . 1625 Eye Street, N.W., Washington, D.C.
Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

FERTILIZER MATERIALS

FOREIGN AND DOMESTIC

- NITROGEN PRODUCTS
- MURIATE OF POTASH
- SULPHUR
- ORGANIC AMMONIATES

INDUSTRIAL CHEMICALS AND VEGETABLE OIL MEALS

EXCLUSIVE DISTRIBUTORS—

DUVAL SULPHUR & POTASH COMPANY

ESCAMBIA CHEMICAL CORPORATION

ASHCRAFT-WILKINSON CO.

Home Office
ATLANTA, GEORGIA

Cable Address: ASHCRAFT

Norfolk, Va.
Charleston, S. C.

Tampa, Fla.
Montgomery, Ala.

Des Moines, Iowa
Jackson, Miss.
Columbus, Ohio